CANCER DEATHS IN THE AGED: PSYCHOSOCIAL AND DISEASE VARIABLES

By

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Relationships between psychosocial variables and the survival of elderly cancer patients were explored. Thirty patients, age 60 and above, with terminal cancer of the lung, breast, or rectocolon were interviewed to elicit a broad range of information regarding attitudes, moods, social support, and socioeconomic status. Variability in survival due to the effects of disease and medical variables was controlled by using a value of relative survival in the analysis that was based on a comparison of expected survival and observed survival.

The survival expectations were determined through a series of regression analyses of biological, medical, and disease information on deceased cancer patients including 266 cases of lung cancer, 101 cases of breast cancer, and 166 cases of rectocolon cancer. The predictor variables included in the exploratory analysis were age, sex, race,

stage, histology, initial treatment, and subsequent treatment. A small number of variables with predictive power were selected for equations used to predict the survival of the 30 patients in the sample.

The psychosocial analysis involved a series of correlation analyses in which psychosocial variables were first compared to survival. The relationships between three additional disease variables and psychosocial status were also explored. These variables included the degree of co-morbidity, the duration of the illness, and the closeness to death.

The results indicate that variability in survival from cancer is largely related to the primary site of the cancer, the stage of the disease, and the treatment given. The findings do not provide evidence of a relationship between psychosocial variables and the survival of elderly patients with terminal cancer. However, a relationship between certain disease variables and psychosocial status is suggested. Higher levels of turmoil were experienced by patients with less co-morbidity. Greater denial was associated with a more recent diagnosis. And, although the relationships were not significant at the .05 level, higher values on all indices of psychological vulnerability were associated with being closer to death. This pattern of relationships suggests that psychosocial status is related to the degree of the illness. A series of 15 recommendations were offered for further study.

CHAPTER I
INTRODUCTION

Background of the Problem

The diagnosis of cancer precipitates a period of uncertainty in the life of the patient and family. And, although the uncertainty of the future underlies this experience, for most people the more immediate questions demand considerable attention. These questions are related to what has caused the disease and what will bring about a cure. These are the questions that are asked of physicians and others involved in medical care. And, with few exceptions, these are questions for which there are no simple or clear answers.

Although there is a great deal that is not understood about the causes of cancer and the reasons for the progression of the disease, medical research has revealed important findings about cancer and cancer treatment. These findings suggest that there are many causative factors in the development of cancer. Environmental factors have been identified as major determinants in most of the cancers that affect humans (Bryan, 1983). The findings also suggest that certain characteristics of the cancer cell are important predictors of how, and how quickly, the disease will progress (Haller & Glick, 1983).

However, in addition to the concepts advanced through traditional medical research, concepts regarding the effect of mental states on the development of cancer and on a cure for cancer are prevalent in our culture. Various concepts of this kind are revealed in the explanations that many cancer patients give for their disease. Certain personality characteristics, conflicts, stress, and loss are suggested as possible explanations for a diagnosis that cannot be conclusively explained by the medical profession. Similar concepts are often central to the beliefs that patients and their families have regarding their recovery or cure from cancer. The willingness to fight the disease, the ability to keep a positive attitude, and the will to live are believed to affect survival from cancer.

Is there a basis for the belief that mental states are related to the development or progression of cancer? This was the fundamental question of this research. The methodology and findings of studies that have explored this relationship provided the background for the approach taken to the problem.

The relationship between mental states and cancer has been studied through two different approaches. One approach has focused on the relationship between certain mental states and the development of cancer. The other approach

has studied the effect of mental states on the progression of disease, and ultimately on survival. Many psychosocial variables have been identified for study.

The role of psychosocial variables in the development of cancer has been the object of many reports in the professional literature. Several variables are repeatedly noted in these reports as being characteristic of persons who develop cancer. They include loss of a significant relationship, major life change, depression, hopelessness, and restricted hostile or aggressive expression (Bahnson & Bahnson, 1964; Greene, 1966; Kissen, 1963; LeShan, 1966; LeShan & Rezikoff, 1960; LeShan & Worthington, 1956).

Although the tone of discussion in many of these reports suggests that the findings support such a relationship, there is no direct evidence of a relationship between psychosocial variables and the development of cancer. These reports are characterized by serious methodological problems that call into question any other conclusions. The primary methodological problems concern the failure to control for important epidemiologic factors, the failure to consider important differences between patients with various cancer types, and the reliance on a retrospective design (Wellisch & Yager, 1983).

Because of the inherent methodological problems, investigation of the relationship between mental states and the development of cancer is now rarely, if ever, pursued. The focus of research in more recent years has been on the relationship between psychosocial variables and the progression of cancer. The outcome that has been evaluated in these investigations is either the first recurrence of cancer or the length of survival from the illness.

Unlike the earlier studies, the investigations concerned with the relationship between psychosocial variables and the progression of cancer have apparently developed from a body of literature concerned with how these variables may affect survival. Although this literature suggests certain hypotheses, the ideas stand as untested theory. That these hypotheses remain untested appears to be the result of methodological obstacles.

It has been, for example, suggested that certain psychosocial variables have either or both a direct effect on disease or an indirect effect. On one hand, it has been suggested that certain psychosocial characteristics result in differing host resistance to the tumor (Pendergrass, 1965) through alteration of endocrine or automatic function (Stavraky, Buck, Lott, & Wanklin, 1968), and in general, through enhancing the susceptibility to disease (Cassel,

1976; Lindsey, Norbeck, Carrieri, & Perry, 1981; Wortman, 1984). It has been postulated that social support may have a buffering function, that it might influence the occurrence of a stressful event, that it may affect the initial appraisal of the event, or that it may alter coping or adaptation.

The methodology and findings of several studies concerned with psychosocial variables and the progression of disease are particularly relevant to this study. These include studies of attitudes and emotional expression assessed at or around the time of the cancer diagnosis and investigations that made similar assessments of patients with terminal cancer.

The relationship between psychosocial variables and survival from cancer was the focus of a report (Stavraky et al., 1968). The survival of patients with various types of cancer was studied by comparing subjects ($\underline{N}$ = 204) in least favorable and most favorable outcome groups to control groups with the same stage of disease. An attempt was also made to control for age, sex, and social class. These authors reported that the group with the most favorable outcome differed from all others in its high proportion of individuals who had strong hostile drives without loss of emotional control.

In the 1970s another investigation involving assessment and five-year follow-up was carried out (Greer, Morris, & Pettingale, 1979). The subjects included 69 breast cancer patients who were assessed preoperatively, 3 and 12 months postoperatively, and then annually for four years. The authors reported a significant association ($p < .05$) between the initial response and the disease outcome. Patients whose initial responses were denial or fighting spirit more frequently had a favorable outcome than those initially showing a sense of helplessness and hopelessness.

In addition to these findings are those reported by Rogentine et al. (1979) who measured psychological factors against the first recurrence of cancer following curative treatment. The control of disease variables was achieved by limiting the sample ($N = 67$) to patients with a single type of cancer and with a similar stage of disease. These authors report that patients who did not have a recurrence expected more life adjustment in order to cope with their disease than those who did have a recurrence.

The designs of these three investigations illustrate two of the primary ways in which the variability in survival due to disease and medical effects can be controlled. This is an issue of central importance in this type of research. Variability in the progression of disease and the survival of cancer patients is known to be affected by disease and

medical variables including the site of the cancer, the stage of the disease, and the treatment given for the cancer.

The investigation by Stavraky et al. (1968) illustrates the use of a comparison group as well as the use of the delineation of the patient population as a means of limiting variability due to disease effects such as cancer site and stage. The second and third investigations (Greer, Morris, & Pettingale, 1979; Rogentine et al.,1979) relied on the delineation of the population as the measure of control of this important part of the variability in survival.

A third approach to the control of variability is illustrated by the work of Weisman and Worden (1975). This research used a statistical procedure to address the control of variability in survival due to disease and medical variables. This methodology was the model for the present study.

In this investigation, the relationship between psychosocial variables and survival was studied through analysis of information on preterminal and terminal cancer patients representing six primary cancer sites ($\underline{N}$ = 35). The determination of their survival as relatively long or short was made by comparing observed survival to the survival that was expected. The expected survival for the patients was

based on regression analyses of medical and biological information on a large number of deceased cancer patients.

Longer survivals were associated ($p < .05$) with maintaining good relationships with others and being receptive to support. Shorter survival was associated ($p < .05$) with depression and pessimism.

Statement of the Problem

There is a prevalent belief in our culture that mental states affect the development and course of illness. This belief is particularly evident in many of the explanations suggested for the progression of cancer and for survival from cancer that is longer or shorter than expected. These beliefs frequently develop in an atmosphere of ignorance concerning the medical and disease variables that are known to affect survival and to contribute to what is expected for patients with certain types of cancer.

Unfortunately, these beliefs have been encouraged by reports of studies that fail to control for the effects of these important variables. And, although the findings of several carefully designed investigations suggest that certain psychosocial variables are associated with longer or shorter than expected survival from cancer, the findings have been loosely interpreted by many in the public and professional community as providing evidence of a causal relationship.

The purpose of this study was to explore the relationship between psychosocial variables and the survival of elderly cancer patients when important biological, disease, and medical variables are controlled. The focus was on the relationship between psychosocial variables and survival and on the extent to which the variability in survival could be explained by a set of psychosocial variables. The contribution of concurrent physical conditions other than cancer to the patients' survival was also considered.

The significance of this study is related to the methods that were used to identify and analyze the effects of several kinds of variables on cancer patient survival. Although research suggests that the survival of cancer patients may be related to psychosocial variables, many variables affect survival, including those related to the disease and treatment. For this reason, careful consideration must be given to the methods used to measure the effects of complicated psychosocial variables. The problems inherent in studying the effects of variables like the will to live and the willingness to fight the disease must be acknowledged and addressed.

The appropriate interpretation of findings concerning the relationship between psychosocial variables and survival depends on how and to what extent these issues are addressed. This study was designed to clarify the relationship between

psychosocial variables and the progression of cancer by identifying and controlling the variability in survival that was due to biological, disease, and medical variables. The focus was on the refinement of the procedure developed by Weisman and Worden (1975) through improvements in the measurement and evaluation of medical and disease variables.

Research Questions

The four research questions were stated as follows:

1. What psychosocial variables are positively correlated with survival?

2. What psychosocial variables are negatively correlated with survival?

3. What proportion of the variability in survival can be explained by a set of psychosocial variables?

4. What proportion of the variability in survival can be explained by a set of psychosocial variables and co-morbidity?

Definition of Terms

The definitions given in this section are presented in a sequence that reflects the relationships between the concepts. The terms defined include those having to do with cancer, cancer treatment, and with the variables studied in this research.

1. The term cancer refers to a group of diseases of unknown and probably multiple causes that occur in all human and animal populations.

2. The term biopsy refers to a procedure in which enough tissue is obtained to determine whether or not it is cancerous.

3. The diagnosis of cancer refers to the date on which the cancer diagnosis was proven by biopsy.

4. The site of the disease refers to the organ in the body in which the cancer first developed.

5. The stage of disease refers to a standard measure of the extent of the cancer at the time of diagnosis.

6. Histology refers to the microscopic characteristics of the cancer cell that are described and classified at the time of the biopsy.

7. Surgery refers to the treatment of cancer by manual or operative means and includes excision of the tumor mass and other methods of manual removal of the cancerous tissue.

8. Radiation therapy refers to the use of x-rays, radioactive isotopes, and other similar forms of radiant energy in the treatment of cancer.

9. Chemotherapy refers to the use of drugs in the treatment of cancer.

10. The term hormonal therapy specifically refers to the use of hormones for the treatment of cancer.

11. Curative treatment refers to treatments given for cancer that are known to have the potential for bringing about a cure for the disease.

12. Palliative treatment refers to treatments given for cancer that are not known to affect a cure but which are given in an attempt to control the development of the disease.

13. The initial treatment is defined as medical treatment for cancer that is delivered in the early phase of the illness following the diagnosis. The initial treatment includes treatments that are begun in the first four months after diagnosis. More than one kind of cancer treatment may be included in the initial treatment. These treatments may be curative or pallative in intent.

14. Subsequent treatment refers to all medical treatments for cancer initiated after the first four months following the diagnosis. More than one kind of treatment may be included in subsequent treatment. The purpose of these treatments is generally palliative.

15. The term recurrence refers to the development of cancer following curative treatment.

16. The term metastasis refers to the spreading of cancer from the primary site.

17. Co-morbidity refers to concurrent disease or physical conditions other than cancer that may contribute to the patient's death.

18. The survival of the patients refers to the number of months that the patient lived beyond the diagnosis of the cancer.

19. Expected survival refers to the number of months that the patient is expected to live after the diagnosis when important biological, medical, and disease variables are considered.

20. Relative survival refers to a comparison of the patient's survival to their expected survival.

21. The term disease variable refers to a variable aspect of the cancer process in an organ of the body. The disease variables identified for study in this research included histology, stage, and co-morbidity.

22. The term medical variable refers to variable aspects of the medical treatment given for cancer, and in the present study included the initial and subsequent treatment.

23. The term biological variable is used to differentiate between individual characteristics such as age, race, and sex, and characteristics of the disease and treatment.

24. Psychosocial variables refer to variable aspects of mental states and human relationships including moods, attitudes, perceptions, social support, and socioeconomic status.

CHAPTER II
REVIEW OF THE LITERATURE

The relationship between psychosocial variables and cancer has been studied through two distinct approaches. The first consisted of investigation of the relationship between psychosocial variables and the development of cancer. The earliest studies approached the problem in this way. The second approach consisted of investigation of the relationship between psychosocial variables and the progression of cancer.

The methodology and findings of both approaches to this relationship are reviewed in this chapter. Studies of the relationship between psychosocial variables and the development of cancer are reviewed in order to develop a perspective of the theoretical and methodological issues. Investigations concerning psychosocial variables and the progression of disease are discussed in greater depth insofar as the findings of these studies are most relevant to the research questions of this study.

The first section, Psychosocial Variables and the Development of Cancer, includes theoretical concepts, research findings, and an evaluation and summary of studies that focus on psychosocial variables as possible causes of

cancer. Important biological concepts are summarized in the first part of the section in order to clarify the bearing that these variables have on the design of studies and the interpretation of findings.

The second and third sections focus on studies of the relationship between psychosocial variables and the progression of cancer. Because of the number of variables that have been studied and the differences in the design of studies, the review of this literature is divided into a discussion of (a) investigations of variables that are largely psychological in nature and (b) investigations of variables that are primarily social. Findings related to socioeconomic status are included in the latter section. Both the second and third sections include theoretical concepts, research findings, and an evaluation and summary of the studies. The important medical and biological concepts related to the progression of cancer are developed in the second section.

Psychosocial Variables and the Development of Cancer

Early reports of the relationship between psychosocial variables and cancer focused on the possible role of these factors in the development of disease. Following a discussion of important concepts, the findings of studies are reported as they relate to (a) intrapsychic conflicts, (b) mental illness and stability, (c) life stress events, (d) depression and hopelessness, and (e) emotional expression.

Theoretical Concepts

Biological and psychosocial concepts are central to this literature. Although the majority of these studies gave little consideration to biological variables, these variables and the underlying concepts have been much more thoroughly studied than psychosocial variables.

Biological concepts

The nature of cancer. The term cancer is generally assumed to refer to a specific disease. However, as Haller and Glick (1983) have pointed out, it encompasses over one hundred distinct disease entities which are very different in their characteristic signs and symptoms, impact on the individual, and potential for cure or control. More than 270 types of human cancers have been recognized and defined by their cellular characteristics (Terry, 1978). The destructive nature of cancer cells is most easily understood in relation to normal cellular activity.

As the American Cancer Society (1981) has pointed out, changes at a cellular level are constantly present in living organisms. Millions of cells die each day and are replaced in an orderly manner. Normal, healthy cells multiply, differentiate into specialized types, and mature. As cells age or are damaged, they are replaced by new, specialized cells of the same type. Cells referred to as cancer cells are those that have developed a permanent defect in their

metabolism causing them to multiply in an abnormal way (Meissner, 1978). Cancer cells typically multiply without organization and without the specialized differentiation that characterizes the normal, healthy cell. If the growth of cancer cells remains uncontrolled, normal tissues are invaded, body functions are disrupted, and death will occur (American Cancer Society, 1981).

Tumors, or neoplasms, represent masses of these cells (Meissner, 1978). They are divided into two main groups, benign and malignant (cancerous). A benign tumor does not invade the normal tissues around it in a manner that typically disrupts body function or threatens life. As Goldfarb (1983) has pointed out, a malignant tumor, on the other hand, not only invades the tissues surrounding it but also gives rise to secondary growths, called metastases, in other parts of the body.

When it is recognized, cancer is not simply identified in terms of the disorganization of the cells, but in terms of the normal cells from which the cancer cells have developed. As Meissner (1978) has pointed out, tumors arise from essentially all tissues of the body. Four main types are identified: carcinomas, which arise from epithelial cells and tend to be solid tumors; sarcomas, which develop from muscle, bone, fat, and other connective tissues; lymphoid tumors; and leukemias, which are cancers of the blood (American Cancer

Society, 1981). According to Bryan (1983), the vast majority of human tumors, about 90%, are carcinomas. And, the majority of research focusing on psychological and social variables considers individuals with cancers of this type.

The amount of resemblance of a tumor to normal cells and tissue and an estimate of its growth rate are considered to be important biological factors in the course of the disease and the potential for cure or control (Meissner, 1978). As Goldfarb (1983) has pointed out, the characterization of cells in this way is referred to as grading.

This issue, that cancer is not one disease but many, is an extremely important issue not only for biologic research but for psychological and social study in this area as well.

The development of cancer. In a broad sense, advances in the understanding of epidemiologic factors in cancers have not resulted in a view of a simplified relationship but rather in an appreciation of a remarkably complex, multi-staged process.

According to Meissner (1978), the causes of the metabolic defect in cancer cells are innumerable. Causative factors may be intrinsic or extrinsic to the individual or animal developing a cancer. Among the intrinsic factors that may be casually related are heredity, age, race, sex, and hormonal and immunological status. Among the extrinsic agents implicated in the development of cancer are chemicals,

viruses, and such physical agents as solar and ionizing radiation (Meissner, 1978). Bryan (1983) has suggested that the review of data of various types and from many sources indicates that environmental factors, especially chemicals, are major etiologic determinants in as many as 60% to 90% of the most frequent carcinomas in humans. However, as Meissner (1978) has pointed out, current concepts also support a theory that the metabolic change from a normal to an abnormal cell often develops in a steplike manner, "as a result of the interplay of multiple causative factors, some acting as the initiating agent and then disappearing, others (or perhaps the same agent) serve as the promoting factors at a later date" (p. 31). And, furthermore, some tumors remain dormant for long periods of time until some other factor, perhaps originating in the host, stimulates them to further growth (Meissner, 1978).

Psychological concepts

In the earliest studies concerning psychosocial variables and the development of cancer, it was not unusual for the disease to be taken as a focus for psychoanalytic interpretation. Complicated speculation based on clinical observation suggested the existence of a "precancerous personality." Other clinicians and researchers explored similar lines of thought in studies relating particular psychological traits, including patterns of emotional expression, to the

development of cancer. And, in recent years, considerable attention has been given to the idea that loss may be antecedent to the development of the disease.

Research Findings

LeShan (1959) noted the long history of consideration of psychological factors and the development of cancer. He pointed out that as early as the second century, Galen set forth a belief that melancholic women were more likely to develop cancer than those who were more confident and vital. Eighteenth and nineteenth century physicians suggested a relationship between emotional trauma and the development of cancer.

Early twentieth century statements of these ideas took the form of hypotheses tested through clinical observations of small groups of cancer patients. In some cases, individuals with a particular site of cancer were the object of study; in other cases, observations were made of individuals with various types of cancer. These were uncontrolled and largely speculative studies with a decidedly Freudian flavor.

Intrapsychic conflicts

For example, Reznikoff (1955) raised the question of hormonal imbalance secondary to psychodynamic conflict in his work which compared women with benign and malignant breast lesions. In a 1952 report on the observations of 40 women, Bacon, Renneker, and Cutler suggested that breast cancer

could be conceptualized as passive suicide precipitated by guilt feelings and depression. And, along similar psychoanalytic lines, an association was suggested (Renneker et al., 1963) between breast cancer and a disturbance of heterosexual impulses characterized by increased oral-dependent needs following a disturbed object relationship. Several writers (Bacon et al., 1952; Bahnson, 1969; Reznikoff, 1955; Tarlau & Smalheiser, 1951) reported observing inhibited sexuality in breast cancer patients.

A relationship between psychological variables and the site of the cancer was also suggested. Booth (1969) concluded that a cancer involved the organ most specifically related to the frustrated psychophysiological object relationship and suggested that cancer developed as an internalized substitute object. Tarlau and Smalheiser (1951) compared women with breast cancer and cancer of the cervix and concluded that oral conflicts were related to the development of the former and genital conflicts to the latter. LeShan and Worthington (1956) also suggested a possible relationship between personality organization and the site of the neoplasm. And, in another investigation from the 1950s, Fisher and Cleveland (1956) compared patients with interior and exterior cancer and asserted that the exterior group had a tendency to conceive of their bodies as surrounded by impenetrable boundaries when compared to the interior group.

Mental illness and stability

The concepts of mental illness and mental stability have also been suggested as variables in the incidence of cancer. These concepts have been investigated both retrospectively and prospectively.

In two follow-up studies of patients with depressive illness, Kerr, Shapira, and Roth (1969) and Whitlock and Siskind (1979) found that cancer deaths were significantly higher ($p < .05$) than expected in males. However, these findings were not confirmed by other researchers (Evans, Baldwin, & Gath, 1974; Niem & Jääskeläinen, 1978) whose results showed no increase in deaths from cancer among patients with unipolar depressive illness. Other research (Rassidakis, Kelepouris, Goulis, & Karraiossefidis, 1972) reported a lower than expected incidence of deaths from cancer among schizophrenic patients but, according to Fox (1978), insufficient data were given to show that they exercised proper controls.

In a prospective study by Hagnell (1966) a statistically significant association ($p < .05$) was found between a personality trait of "substability," said to be similar to Eysenck's extraversion dimension, and cancer. However, both the sample size (20 males and 22 females) and the statistical analysis have been criticized (Fox, 1978).

Personal integration was the focus of study (Grissom, Weiner, & Weiner, 1975) in a comparative investigation of healthy subjects and patients with bronchial carcinoma or emphysema. The authors reported that the cancer patients achieved a lower personal integration score on the Tennessee Self-Concept Scale. However, the prospective investigation by Keehn, Goldberg, and Beebe (1974) supported a view that emotional instability per se does not increase the likelihood of cancer.

Life stress events

The findings of several studies suggested that life stress events frequently preceded the appearance of several forms of cancer (Bahnson & Bahnson, 1964; Greene, 1966; Horne and Picard, 1979; Jacobs & Charles, 1980). In addition, a number of other retrospective investigations reported a particularly high incidence of cancer among individuals that had lost an important emotional relationship, reported marital problems, or separation of parents (Bahnson & Bahnson, 1964; Fox, 1978; Greene, 1966; LeShan, 1966; Lombard & Potter, 1950; Schmale & Iker, 1964, 1966). Cancer also was reported to appear in higher than expected frequencies among individuals that were widowed, divorced, or separated (Greene, 1966; LeShan, 1966; Lombard & Potter, 1959).

Prospective studies have essentially supported the contention that psychological factors associated with stress are predictive of later cancer development (Greer & Morris, 1975; Hagnell, 1966; Harrower, Thomas & Altman, 1975; Thomas, 1976). Horne and Picard (1979) reported that individuals that were subsequently diagnosed with malignant lung tumors reported less job stability, lack of plans for the future, and loss of a significant relationship in the preceding five years relative to patients that developed benign lung tumors.

The notion of a role of traumatic separation in the development of cancer has not, however, been supported by other findings (Graham, Snell, Graham, & Ford, 1971; Greer & Morris, 1975; Muslin, Gyarfas, & Pieper, 1966).

Depression and hopelessness

Depression and hopelessness are frequently asserted to be characteristic of persons who develop cancer. Engel (1967) noted the view of the giving up/given-up syndrome with its attendant affects of hopelessness and helplessness as being a frequent precipitant of disease in general. However, most of the studies reporting in this area are based on retrospective analysis of diagnosed patients; controls are lacking.

According to one group of researchers (LeShan, 1966; LeShan & Reznikoff, 1960; LeShan & Worthington, 1956) depletion and depression earmarked patients who were experiencing

a serious difficulty in their lives prior to the diagnosis of cancer. Bahnson and Bahnson (1964) claimed that denial and repression together with depression are a feature of patients with cancer. Renneker et al. (1963) also reported depressive reactions prior to the onset of cancer and speculated about the possibility of decreased host resistence due to depression. Schmale and Iker (1971) reported that cancer seemed to develop in patients who reported "giving up" and feelings of severe hopelessness.

With a different perspective on the importance of these emotional states, Greene (1966) reported that a majority of mothers of children with leukemia and lymphoma had been depressed and/or anxious for weeks or months prior to the onset of the child's disease.

Attempts to approach this issue in prognostic studies include the work by Schmale and Iker (1966, 1971), in which the presence of cervical cancer was significantly predicted ($p < .05$) by a predisposition for experiencing hopelessness, as assessed at interviews conducted before biopsy. In 1979, Spence reported a reproduction of Schmale's work with patients who were to be screened for cervical cancer by cone biopsy. He found that he could predict outcome associated with depression and hopelessness.

Emotional expression

One group of researchers (Abse et al., 1974) pointed out that among the personality characteristics often attributed to cancer patients are repression and denial, poor outlet for emotional discharge, inability to express hostile feelings, rigidity, impairment of self-awareness and introspection, a tendency to self-sacrifice and self-blame, a "reality orientation," and a predisposition for experiencing hopelessness and despair.

Among the researchers to first focus on the relationships between the development of cancer and characteristic patterns of emotional expression were LeShan and Worthington (1956). They contended that cancer patients characteristically have an inability to express hostile feelings. Reduced aggressive expression was identified as a factor by both Bacon et al. (1952) and Stavraky et al. (1968).

In the 1960s, the work of David Kissen was well-respected for its attempts to study this issue in a systematic manner and with controls. In his study of male lung cancer patients, Kissen (1963) found that men with lung cancer differed significantly ($p < .05$) from controls with other pulmonary disease in having restricted outlets for emotional discharge. He and his associates (Kissen, Brown, & Kissen, 1969) claimed to confirm this in 1969.

Studies in the 1970's of women with breast cancer lend support to this idea. In a controlled study carried out by Greer and Morris (1975), supression of anger was found to be correlated with the diagnosis of breast cancer. However, the correlation was reported to reach statistical significance ($p < .05$) only in women under age 50. Supression of anger was also reported to be associated with cancer in two controlled studies of women prior to biopsy for breast lumps (Margarey, Todd, & Blizzard, 1977; Morris, Greer, Pettingale, & Watson, 1981).

A study (Dattore, Shontz, & Coyne, 1980) comparing individuals who developed cancer with those who did not lends suport to the idea that suppression of feelings occurs more frequently among persons who subsequently develop cancer than among control subjects. And, the findings of a longitudinal study (Grossarth-Maticek, Siegrist, & Vetter, 1982) of 1353 inhabitants of a Yugoslav town from 1965 to 1975 suggested that being a "passive receiver of repression" was associated with the subsequent incidence of cancer.

Evaluation and Summary

The evaluation and summary of the literature relating psychological variables to the development of cancer are considered in two areas of discussion: (a) hypotheses and methodological issues, and (b) summary of findings.

Hypotheses and methodological issues

As Crisp (1970) pointed out, studies that investigated premorbid, or precancerous, personality factors leaned heavily upon theory and speculation which was far beyond what was immediately suggested by the data. The early studies tended to search for specific personality types associated with specific cancer types. As one group of reviewers (Surawicz, Brightwell, Weitzel, & Othmer, 1976) pointed out, personality was frequently defined in terms of psychodynamic variables. Despite the great variety of hypotheses advanced, according to Wellisch and Yager (1983) "no good hypotheses exist that specify which personality factors might lead to cancer for what specific reasons" (p. 145). In their thorough analysis of this literature, they asserted that "the best that those dealing in psychodynamics have been able to do thus far is to offer interpretations as to why people who already developed cancer have done so, but not why they rather than others have the disease" (p. 146). Early studies in this area are also characterized by serious methodological problems. As Surawicz et al. (1976) pointed out, the difficulties with the approaches taken resulted in part from the lack of carefully designed longitudinal studies. As recognized in this review (1976), most studies did not have control groups but were based on clinical observation of small numbers of cancer patients; the

few investigations that did employ control groups used poorly matched controls.

Failure to consider important differences between patients with various cancer types also seriously compromised many of the early investigations. As Wellisch and Yager (1983) point out, "To lump all cancers together is equivalent to lumping all heart diseases, lung diseases, or anemia together" (p. 146). Also, as has been previously noted, important epidemiologic factors were rarely controlled; yet they may be directly related to the appearance of cancer, more than the psychological or personality variables.

Perhaps the most common characteristic of the research methodology employed by these early investigations is a retrospective design. In spite of attempts by some researchers to employ a systematic approach, in the retrospective studies "the possibility cannot be excluded that the reported psychological variables follow rather than precede the development of cancer" (Greer & Silberfarb, 1982, p. 568). Even those observations made early in the diagnostic process cannot be said to reveal phenomena that existed without question, prior to the development of cancer (Wellisch & Yager, 1983). As Greer and Silberfarb (1982) pointed out, "Only prospective studies can provide proof of an association between cancer and antecedent psychological variables" (1982, p. 568). That is, the impact that having cancer might have

on an individual's responses must be considered. It is likely that overriding anxiety may make it impossible to study the basic personality prior to the onset of the disease (Finn, Mulcahy, & Hickey, 1974).

As regards the evaluation of life stress events and the occurrence of cancer, Sklar and Anisman (1981) noted that it is likely that the cancer was present prior to and during reported stress events since the signs and symptoms of cancer may occur several years following the neoplastic change. In addition, these reviewers questioned the validity of the patient's views of their past stress history, especially considering the physiological consequences of cancer on mental and behavioral functioning.

A final methodological issue raised by Wellisch and Yager (1983) concerned the validity of psychological tests used in these studies. They noted the need to distinguish between trait and state features of personality and pointed out that the majority of psychological tests used in these studies have not been tested for the characteristics on cancer populations, so their significance in this area is not known.

Summary of findings

Conclusions regarding the role of psychological variables on life stress events in the development of cancer

must be drawn cautiously and must remain stated as suggestive of a relationship. From the viewpoint of two major reviewers (Fox, 1978; Surawicz et al., 1976), the concept of a specific carcinogenic personality has not been clearly supported. According to Levy (1982), there is no direct evidence for the development of cancer in animal models or man associated with natural life trauma. And, as Wellisch and Yager (1983) pointed out, "In patients who evidence emotional or psychological developmental conflicts, all that can be said is that such findings are associative, but not that the findings cause cancer" (p. 149).

From their thorough review of animal and human studies relating stress and cancer, Sklar and Anisman (1981) concluded that despite the problems, these studies provisionally suggest that certain psychosocial variables are associated with higher cancer incidence. Among the variables frequently noted are loss of a significant relationship or major life change, depression and hopelessness, and restricted hostile or aggressive expression.

Psychological Variables and the Progression of Cancer

Efforts to establish a relationship between psychosocial variables and the development of cancer provide a historical reference to the direction taken by more recent,

and more carefully designed investigations. In these studies, a variety of psychosocial characteristics are related not to the development of cancer but to the progression of the disease. Most often, the survival of individuals from diagnosis until death is used as the outcome variable.

These investigations are concerned with the general issue of whether psychosocial variables have a bearing on how long an individual lives beyond a cancer diagnosis. Studies that consider variables that are primarily psychological in nature are considered in this section. Following a discussion of important concepts, the findings are reported as they relate to (a) attitudes and emotional expression, (b) attitudes of those with advanced disease, and (c) disease variables and psychological status.

Theoretical Concepts

Several concepts are central to this part of the literature. Among the biological concepts are those related to the growth of cancer and to cancer treatment. In addition are concepts regarding possible psychosomatic mechanisms.

Medical and biological concepts

The microscopic characteristics of cancer cells referred to through histology and grade are known to be important prognostic indicators. Several additional biological concepts are important to the prediction of

survival. These include the manner in which cancer progresses or spreads, the extent of spread at the time of diagnosis, and the means by which efforts are made to eradicate the disease or control its progression through treatment. These concepts will be discussed in order to develop a perspective for the evaluation and summary of the related literature.

Local growth and metastasis. According to the American Cancer Society (1981), when a small group of proliferating cancer cells begins to invade and destroy adjacent healthy tissues, cancer becomes a destructive process. This invasive group of cells, the tumor mass, has already undergone changes in size, shape, and nuclear pattern. The transition from the normal character of cells to the malignant character that results in invasion is a progressive process that may occur rapidly or over many years.

In addition to the growth of the tumor in the original, or primary site, cancer that remains uncontrolled spreads to other distant sites in the body. This spreading of the disease to distant sites is referred to as metastasis. It is, as Wolberg (1983) has pointed out, this process that usually kills cancer patients.

The spreading of tumor, or metastasis, can occur in several ways. According to Wolberg (1983), metastasis can

occur through direct invasion of contiguous organs, through implantation, and by passage through the lymphatic system or blood stream. That different histologic types tend to metastasize at different rates (and to particular sites) is an important consideration in the design of studies seeking to identify psychosocial variables in the progression of disease. That is, the site and histology of the cancer must be limited or controlled for when comparisons of survival of patients are made.

Staging of disease. It is not uncommon for individuals to hope that one with cancer will be given attention before it is "too late." The concepts of "early" and "late" in cancer care are integrally related to the extent of spread of the disease from the primary site of development. As Haller and Glick (1983) have pointed out, smaller and more localized cancer can be treated more successfully and less radically. Because of this, at the time treatment is initiated, an important feature of an individual tumor is the extent of spread, or metastasis. The assessment of the metastasis of cancer is made through a process called staging which takes into account such characteristics as tumor size, invasion into adjacent tissues, metastasis to lymph nodes in the region of the tumor, and metastasis to distant sites (Haller & Glick, 1983).

The therapeutic approach to the illness and the prognosis are determined, according to the authors cited above, to a great extent by the stage of the disease (Haller & Glick, 1983). Certain curative treatment approaches are not considered when the disease is in an advanced stage. And, while individuals with a particular type of cancer may be similar in many other respects, their survival from the time of diagnosis will differ to a great extent according to the stage of the disease when treatment of any kind is initiated. Hence, this biologic variable and its characterization through staging must be considered in both design and interpretation of studies identifying other additional variables related to survival.

Treatment for cancer. The survival of an individual with cancer is also related to the success of efforts to intervene in the natural course of the disease. According to the American Cancer Society (1981), the treatment of cancer and precancerous lesions has one of three aims: prevention, cure, or palliation. The specific aim of the treatment depends on the histologic nature of the tumor and the stage of the disease.

Cancer is generally considered cured if the individual survives for five years, without a recurrence, following initial detection and treatment. However, even when a cure

cannot be achieved, therapy that slows the growth or spread of the tumor may prolong life significantly. Therapy with this aim is referred to as palliation (American Cancer Society, 1981).

Three basic treatment approaches are used in both curative and palliative cancer care: surgery, radiation therapy, and chemotherapy.

According to Haller and Glick (1983), surgery is historically the first form of treatment for cancer. It seeks to eradicate the tumor by the complete removal of all cancerous and pre-cancerous cells (American Cancer Society, 1981).

In addition, many cancers are now treated with radiation delivered either through an external beam or through an implant of radioactive material. Because cancer cells are more sensitive to x-rays and radioactive substances than are normal cells, radiation therapy is used in the prevention, curative treatment, and palliation of many cancers either alone or with another treatment modality (American Cancer Society, 1981).

According to Haller and Glick (1983), the use of drugs in the treatment of cancer is a relatively new event that has had a great impact on cancer care. They have pointed out that chemotherapy, unlike surgery or radiation therapy, is a systemic treatment. That is, both surgery and radiation

therapy treat cancer at a specific site while chemotherapy, through its action in the bloodstream, travels through the system and is potentially effective against cancer cells at great distances from the primary site. As the American Cancer Society (1981) has pointed out, most chemotherapeutic agents disrupt the development and reproduction of cells. Malignant cells grow and reproduce more rapidly than normal cells and, hence, are more susceptible to the effects of these drugs.

In recent years, treatment approaches to cancers have been effectively combined in what is referred to as combined modality therapy. According to Haller and Glick (1983), the overall attempt of this approach, combining surgery, radiation, and chemotherapy, is to maximize the curative potential of each modality while minimizing morbidity.

Psychological concepts

Even when medical and biological variables such as site, histology, and treatment are held constant, some individuals with cancer survive appreciably longer than others. One of the theories advanced in explanation of this concerns differing host resistance to the tumor (Pendergrass, 1965). As Stavraky et al. (1968) have pointed out, factors have been studied and psychosomatic mechanisms considered as possibly affecting the growth and dissemination of cancer by altering endocrine or autonomic function. As they have pointed out, the growth rates of certain types of cancer depend to some

extent on hormones; in these types endocrine mediation of the effect is very conceivable. And, as recognized by these researchers, the influence of psychological states on endocrine and autonomic function has been extensively studied.

Research Findings

Because of the complexity of the relationships postulated and the methodologic problems that exist, most research efforts in this area have not attempted to simultaneously establish the relationships and explore the biologic pathways responsible for them. Recent research efforts have largely been concerned with the description of psychological variables related to survival through investigations that represent significant improvements in design over the early studies of psychological variables and the development of cancer. What follows is a discussion of the major studies related to this issue.

Attitudes and emotional expression

One of the earliest studies relating psychological factors to the outcome of human cancer was conducted during the 1960's by Stavraky et al. (1968). At the time of the first contact with the Ontario Cancer Clinic, personality and intellectual assessment was carried out with 204 patients (83 breast, 36 cervix, 28 lung, 57 other sites). The testing included the Minnesota Multiphasic Personality Inventory (MMPI), a projective technique, and the verbal component of

the Wechsler Adult Intelligence Scale (WAIS). Follow-up ranged from 40-66 months. The outcome was defined as the duration of survival from the date of admission to the date of death. The analysis of data was based on comparison of subjects in least favorable and most favorable outcome groups to stage-matched controls with average outcome. These groups were developed from cases whose survival times were in the shortest or longest quartile of site and stage-specific life tables calculated for the patients in the sample. An attempt was made to control for age, sex, social class, site, and stage. The results of the study were based on a final comparison of 23 patients with a most favorable outcome with 46 stage-matched controls of average outcome and 30 patients in the least favorable group compared with 90 stage-matched controls.

Stavraky et al. (1968) reported that the group with the most favorable outcome differed from all others in its high proportion of individuals who had strong hostile drives without loss of emotional control. The group with the least favorable outcome differed little from its control.

A second investigation (Greer, Morris, & Pettingale, 1979) involving assessment and five-year follow-up of patients was carried out with breast cancer patients in the 1970s. Clinical and psychological assessments were made preoperatively, 3 and 12 months postoperatively, then annually for four years with a consecutive series of 69

breast cancer patients. All were less than 70 years old with Stage I and II disease and all received simple mastectomy. Twenty-five randomly selected patients also received post-operative radiation therapy. Rating scales used in the psychological assessment included one developed by the authors for social adjustment, the Hamilton Rating Scale, the Caine and Foulds Hostility Questionnaire, the Eysenck Personality Inventory, and the Mill Hill Vocabulary Scale. Variables evaluated included initial reactions, delay, characteristic response to stressful events, ability to express feelings, and occurrence of depressive illness or loss five years prior to the diagnosis. In follow-up visits, social adjustments, depression, and psychologic responses to the diagnosis were re-evaluated. Based on the findings of a pilot survey the responses to the diagnosis were grouped into four categories: denial, fighting spirit, stoic acceptance, and feelings of helplessness/hopelessness.

At the end of the five year follow-up period, 33 women were alive with no evidence of disease, 16 were alive with metastatic disease, and 18 had died of the cancer. The authors reported no significant associations ($p > .05$) between five-year outcome and the following variables: age, social class, reaction on discovery of cancer, delay, habitual reaction to stress, expression of anger, depression, hostility scores, or previous loss. There was a tendency for the unmarried or those with poor marital relationships to

have a less favorable outcome. A significant association ($p < .05$) between the initial response and outcome was reported. Patients whose initial responses were denial or fighting spirit more frequently had a favorable outcome than those initially showing stoic acceptance or a helpless/ hopeless response.

Additional analysis of data from this series (Pettingale, Philalithis, Tee, & Greer, 1981) showed no evidence that biological factors biased the composition of the groups or accounted for the observed differences in outcome. And, some support was given to the notion of a neuroendocrine or immune pathway for the observed effect by additional findings from the same analysis of different levels of serum immunoglobulin levels among the women with different initial responses to the diagnosis.

Unlike the previous studies, a prospective investigation by Rogentine et al. (1979) measured psychological factors against the first recurrence of cancer following curative treatment. Experimental control was enhanced by limiting the sample to patients with a single cancer type, cutaneous malignant melanoma, and to those in either clinical Stage II or unfavorable prognostic subcategories of clinical Stage I. Two consecutive groups of white patients, 67 altogether, were evaluated one week after surgery with the Recent Life Changes Questionnaire, a symptoms check list,

and the Locus of Control. A "melanoma adjustment score" was also recorded based on the patient's rating on a scale of 1 to 100 the amount of personal adjustment needed to handle or cope with having melanoma and having surgery for it.

For the purpose of data analysis, the first series was divided into halves. In the first group, psychological variables were identified which significantly ($p < .05$) differentiated patients who had a recurrence from those who had not. These variables were then applied as a predictor of recurrence for the second group.

According to the authors, the melanoma adjustment score discriminated those with and without recurrence of melanoma by one year ($p < 05$). Patients who did not have a recurrence as a group expected more life adjustment in order to cope with their disease. The independence of this variable from biological factors was suggested by the finding that the adjustment score did not correlate significantly with the number of malignant lymph nodes identified through surgery; this an important prognostic indicator. The authors reported that combining the information on malignant lymph nodes with the melanoma adjustment score improved the accuracy of prediction in the group with recurrence. Depression, on the other hand, did not predict recurrence.

Rogentine et al. (1979) suggested that "subjects scoring low on the scale are using denial or repression of

the impact of the disease (lack of concern), while those reporting a need for more adjustment are realistic in their appraisal of the illness" (p. 653-654), and that the former could be regarded as having reduced emotional reactivity.

Attitudes of those with advanced disease

A 1975 report (Weisman & Worden, 1975) illustrates a methodology controlling for medical and biological variables without the use of control groups. In this study, psychosocial information was collected on preterminal and terminal patients representing six primary sites: breast, cervix, colon, lung, lymphoma, and stomach. Patients included in the sample were those who were thought to possibly die in the foreseeable future; actual survival beyond the assessment ranged from four weeks to one year. The determination of each patient's survival as relatively long or short was made by comparing observed survival to the survival expected based on regression equations previously calculated from medical and biological information on a large series of deceased patients.

Longer survivals were associated ($p < .05$) with patients who previously had and were able to maintain good relationships with others, who were receptive to medical and emotional support, and who accepted the reality of their illness without a sense of hopelessness, despair, or deep depression. Social position was also positively correlated ($p < .05$) with survival. Shorter survivals occurred in

individuals who reported poor social relationships, deepening depression and pessimism when treatment failed, and according to the authors, a desire to die, "a finding that often reflects more conflict than acceptance" (Weisman & Worden, 1975, p. 71).

Another study of the attitudes of patients with advanced disease is reported by Achterberg and Lawlis (1977). In this investigation, a group of 126 patients with a broad range of diagnoses of different cancer types, 90% of which were widely metastatic, were evaluated for both psychological and blood chemistry variables. The psychological battery included the MMPI, the Locus of Control, the Fundamental Interpersonal Relations Orientation -- Behavior, the Bem Sex-Role Inventory, the Profile of Mood States, and a projective measure, Image-Ca. There was a limited follow-up period of two months.

According to the authors, psychological factors did predict follow-up disease status. Blood chemistries indicated no such relationship. The writers asserted that patients who used a great deal of denial, saw their bodies as having little ability to fight the disease, and expressed significant dependencies on others were more likely to receive a poor disease prognosis at two-month follow-up.

This work is severly compromised by failure to control for treatment and disease variables and by the inability to

separate the possible effects of the disease process itself on psychological responses.

Disease variables and psychological status

Despite attempts in the studies reviewed to control for important medical and disease variables in psychosocial analysis, few attempts have been made to evaluate the effects of other organic factors on the psychological status of patients, and subsequently, on their survival. A 1973 report (Davies, Quinlain, McKegney, & Kimbell, 1973), explored these relationships. A total of 46 patients with metastatic or widely invasive cancer or with hematologic disorders considered to be incurable were studied. All were receiving or preparing to receive chemotherapy treatment. On the average, patients had been diagnosed 28 months prior to the interview. The average period of survival from the date of the initial interview was 205 days. The minimum follow-up period was eight months. Through a semi-structured interview, information was elicited regarding the patient's feelings about his illness, knowledge of the disease, concerns over death, and ways of adaptation to the illness. Additional test data were subsequently obtained on 18 randomly selected patients using the WAIS, Draw-A-Person, part of the Thematic Apperception Test, time estimation, and time production. All patients completed the Cornell Medical Index, the Laxare-Klerman Personality Inventory, the Locus of Control, and the Multiple Affect Adjective Checklist.

According to the authors, of importance in the findings was the correlation of organic factors with better adjustment to cancer. They reported that high scores on the constellation "apathetic-given-up" correlated strongly with a shorter survival time but also with a greater degree of illness. According to the authors, these findings suggested that psychological adjustment may not be directly related to an earlier death but rather that "the psychological state, along with the earlier death, is a product of the disease process" (Davies et al., 1973, p. 470).

The relationship between organic factors and depression in cancer patients was also noted by Sherman (1983) who pointed out that much that has been labeled depression in the cancer patient population may really reflect somatic illness. He noted that among those medical problems that mimic clinical depression, metastatic disease, electrolyte disturbance, nutritional status, and drug-induced mental depression are probably most common in hospitalized cancer patients.

The findings of Derogatis, Abeloff, and Melisaratos (1979) also suggest the need for further evaluation of the relationship between physical factors, adjustment, and survival. In this study, long-term survivors showed more emotional distress, poorer adjustment to their illness and more negative attitudes toward their physicians than the

short-term survivors. However, the short-term survivors had a longer duration of prior chemotherapy.

Evaluation and Summary

The evaluation and summary of these studies are given in terms of the hypotheses and methodological issues as well as in a summary of the findings.

Hypotheses and methodological issues

Many of the studies concerned with the relationship between psychological variables and the progression of cancer addressed important methodological issues through their design. However, the hypotheses or research questions were stated in a very general way without delineation of specific variables or mechanisms for their effect on disease and on survival. This appears to be a consequence of the present state of understanding of these complicated relationships and seems to reflect the limited understanding of psychosomatic relationships.

The control of important variables related to the disease or treatment for the disease was achieved to a greater extent in these investigations through the use of control groups, by the specifications for the sample, or through statistical means. And, although there were clear improvements in the measurement of psychological variables, the findings do not differentiate between state and trait features of the personality or between more transient or abiding psychological states.

Summary of findings

The research findings are summarized in the order in which they were presented in the preceding section, that is, in terms of attitudes and emotional expression assessed at or around the time of diagnosis, attitudes and emotional states of those with advanced disease, and the role of disease variables as mediating variables in adjustment or psychological status.

Attitudes and emotional expression. Individuals with a favorable outcome or longer survival included those with strong hostile drives without loss of emotional control at and around the time of diagnosis (Stavraky et al., 1968). Their reaction to the diagnosis was described as one involving denial or a fighting spirit in contrast to those with shorter survival who responded with a sense of helplessness and hopelessness (Greer & Morris, 1975) and reduced emotional reactivity in general (Rogentine et al., 1979). In general terms, these individuals were observed to have more emotional distress, poorer adjustment, and to express more negative attitudes towards physicians (Derogatis et al., 1979). Although these results suggest the importance of these variables, additional findings by Greer and Morris (1975) include no statistically significant ($p > .05$) difference between longer and shorter survivors in terms of expression of anger, depression, or hostility.

In addition, it was reported by Rogentine et al. (1979) that individuals with a more favorable outcome as defined by recurrence free survival one year after diagnosis and treatment expected that a great deal of adjustment would be required.

Attitudes of those with advanced disease. During the pre-terminal and terminal phase of the illness, patients with advanced disease who had shorter survival were reported (Weisman & Worden, 1975) to have expressed a sense of pessimism, conflict, depression, and a desire to die. The same authors reported that those with longer survival had a realistic attitude about their illness without a sense of hopelessness or fatalism.

Disease variables and psychological status. An additional dimension of these complex relationships was suggested by the findings of both Davies et al. (1973) and Derogatis et al. (1979). In the first case (Davies et al., 1973) an attitude of "apathetic-given-up" was strongly correlated with a shorter survival time but also with a greater degree of illness. In the second case (Derogatis et al., 1979) the attitudes of long and short-term survivors differed, but so did their treatment history. The short-term survivors had a longer duration of chemotherapy prior to the evaluation. Both reports lend support to the idea that both psychological status and shorter survival may be related to disease variables.

Social Support, Socioeconomic Status, and the Progression of Disease

Few studies have specifically focused on social support and the progression of cancer. However, the findings of several studies regarding social support and mortality from various causes are applicable to this issue in many respects. The report of these findings is preceded by a discussion of the concept of social support. The section concludes with a description of the findings from studies of socioeconomic status and the progression of cancer.

Theoretical Concepts

Conceptualizations of social support include a variety of dimensions of both psychological and material support. Social support has been described (Weiss, 1974) in terms of the provision of attachment, social integration, opportunity for nurturance, reassurance of worth, a sense of reliable alliance, and obtaining of guidance as well as by the expression of positive affect, the giving of symbolic or material aid, and the affirmation of another person's behaviors, perceptions, and views (Kahn, 1979). According to Caplan (1974), social support is embodied in enduring relationships which provide help for the individual in mobilizing psychological resources and mastering emotional burdens, sharing tasks, and providing material supplies. And, Cobb (1976) has asserted that support consists of

information leading the person to believe that he or she is cared about, esteemed and valued, and a part of a network of mutual communication and obligation.

According to Berkman and Syme (1979), the research has suggested that individuals living in situations characterized by poverty and social disorganization as well as those undergoing rapid social and cultural change appear to be at increased risk of acquiring many diseases, including coronary heart disease, cerebrovascular disease, and cancer. Other investigations have suggested that social support may not contribute directly to physical disorder (Wortman, 1984) but may have a protective function and serve as a stress-buffering or moderating role in health outcomes (Cobb, 1976; Lindsey et al., 1981). However, as has been pointed out (Murawski, Penman, & Schmitt, 1978), serious measurement and conceptual problems exist. Berkman (1983) has pointed out that this problem in life events/social support research arises because stress and support are not operationally or conceptually independent variables. She has asserted that "many life changes -- in fact, the ones most consistently associated with poor health -- are actually losses or breaks in social ties" (Berkman, 1983, p. 748). It has been hypothesized (Mueller, 1980) that much of the impact of life events may result from the disturbance they introduce into the individual's social network.

It has also been suggested (Cassel, 1976) that stress enhances susceptibility to disease. Although little study has been made of how social support protects people from distress, and hence, influences health outcomes, both Cobb (1976) and Wortman (1984) have speculated that more than one mechanism may be involved. As Cobb has pointed out, two major classes of theoretical views have been considered. The first suggests a direct effect through neuroendocrine pathways; the second suggests an indirect effect. Among the indirect effects that has been suggested by Wortman is that social support might influence the occurrence of the stressful event being studied. Wortman also noted that once a stressful event such as the diagnosis of cancer has occurred, social support may influence the way the event is intially appraised, and hence, influence subsequent outcomes. Both Wortman and Cobb have suggested that social support may alter coping and adaptation or that it may facilitate effective coping by enhancing motivation to engage in adaptive or compliant behaviors. Wortman has noted that an indirect effect on coping might result from the enhancement of self-esteem, and she has suggested that social support may also protect people from the deleterious effects of stress by altering their mood. Finally, Wortman has recognized that the relationship between social support and health outcomes is further complicated by the fact that prognosis, coping, or previous adjustment influences the amount of support available.

Research Findings

The findings reviewed below on the relationship between social support and mortality are derived primarily from prospective studies with varying sample sizes. Among the findings are results from two large prospective investigations (Berkman & Syme, 1979; House, Robbins, & Metzner, 1982) and an analysis (Blazer, 1982, 1983) of data collected during the validation of the Older Americans Resources and Services (OARS) at Duke University. Reports on the role of socioeconomic status and mortality of individuals with cancer are also briefly considered in this section.

Social support

Social networks, host resistance, and mortality were evaluated (Berkman & Syme, 1979) in a nine-year follow-up survey of 3725 men and women ages 30-69 studied by the 1965 Human Population Laboratory, Alameda County, California. Each of the four sources of social contact studied was found to predict mortality independently of the other three. The strongest predictors were the more intimate ties of marriage and contact with friends and relatives.

Marriage, contacts with close friends and relatives, church membership and informal and formal group associations made up the four categories of social contact studied by Berkman and Syme. According to the authors, with few exceptions, respondents with each type of social tie had

lower mortality rates than respondents lacking such connections. Married individuals in each age and sex group had lower mortality rates than the nonmarried. The finding was significant ($p < .05$) for men but failed to reach significance for women. Both men and women who reported little contact with friends had significantly higher mortality rates. Similar findings were reported with respect to church membership and group affiliations. Individuals who belonged to a church or temple had lower mortality rates than others as did those with other group affiliations.

Additional analysis of the data involved the consideration of a social network index that considered not only the number of social ties but also their relative importance. The findings revealed a pattern of increased mortality rates associated with each decrease in social connection that was not accounted for by an association between social disconnection and physical illness. The analysis was controlled for a variety of health practices, and with the exception of a cumulative index of health practices, these did not exert an independent effect. Although the findings of this report indicated that people lacking many social and community ties were 2.5 times as likely to die in the follow-up period, the authors pointed out that it is not known whether the risk factors influence disease incidence or survival time. It is also relevant (Berkman, 1983), that social isolation did not

seem to predict mortality more strongly in the older age groups than in the younger groups. In this more recent report, Berkman suggested that "it appears that social isolation does not particularly diminish in its potency as a risk factor for mortality in higher age groups; nor does it increase" (p. 744-745). She also notes that the data did not suggest that living alone, being single, or not having family were indicative of social isolation. In fact, she notes that most people, even older people, were apparently flexible in their ability to form new relationships and make suitable trade offs and substitutions.

The Tecumseh Community Health Survey (House et al., 1982) was reported as a partial replication of the work by Berkman and Syme reviewed above. Based on a cohort of 1322 men and 1432 women ages 35-69, this nine-year follow up survey included structured personal interviews and medical examination. Four measures of social relationships and activities were studied: intimate social relationships; formal organizational involvements outside of work; active and relatively solitary leisure; and passive and relatively solitary leisure.

Passive, solitary leisure activities were positively associated with mortality among men. The more involved men were in all of the other social relationships and activities, the less likely they were to die. Results for women were less

strong and consistent. While passive leisure activities were even more positively related to mortality among women, only church attendance was significantly ($p < .05$) and negatively associated with mortality. The authors also noted that with the exception of only one "anomalous result for women," there was no evidence that satisfaction with relationships had any significant association with mortality once the intensity or frequency of an activity was controlled. Furthermore, in concurrence with Berkman and Syme (1979), these writers asserted that these data suggest that the relationship is not a spurious product of preexisting illness.

An analysis of data (House et al., 1982), was also carried out for deaths from cancer and ischemic heart disease. Social relationships and activities generally were negatively associated with mortality from both of these causes for men and women. The finding was significant at the .05 level even after controls for important risk factors were included.

A 1982 report of findings by Blazer is based on a secondary analysis of the community sample evaluated in the fall of 1972 in Durham County, N.C., for the development of the OARS Assessment Inventory. Three parameters of social support shown to be independent were studied in this elderly community population: roles and available attachments, frequency of social interactions, and perceived social

support. The sample included 331 persons 65 and older, selected randomly from the large group. Follow-up was made 30 months after the initial assessment. Among the variables controlled for in a regression analysis were age, sex, race, economic status, physical health status, self-care capacity, depressive symptoms, cognitive functioning, stressful life events, and cigarette smoking.

According to Blazer(1982), the three separate parameters of social support were significant ($p < .05$) risk factors for 30-month mortality (the causes of mortality were not given). In apparent contrast to the findings reported by House et al. (1982), the parameter with the highest predictive value was perceived social support, a subjective appraisal of the network.

An additional aspect of the data analysis (Blazer, 1983) concerned the impact of depression on the social networks. Blazer reported that the depressed individuals "were more likely to be older and to have alcoholic problems, an increase in economic impairment, physical health impairment, and impairment of activities of daily living" (Blazer, 1983, p. 163). Both at the initial analysis and at the 30 month follow-up, impairment in social support was significantly more frequent in the depressed ($p < .05$) and this impairment appeared to increase at a faster rate than in the nondepressed. However, Blazer contended that the data

presented suggest that these depressed individuals did not suffer a relative decrease in social support over time when compared with the nondepressed.

The impact of social support on mortality from cancer was reported among the findings of both Greer and Morris (1975) and Weisman and Worden (1975). In their study of 69 breast cancer patients, Greer and Morris reported a tendency for unmarried or those with poor marital relationships to have a less favorable outcome. The findings were not statistically significant at the .05 level. Similarily, terminal cancer patients with longer survivals in Weisman and Worden's (1975) investigation were those with good relationships with others who were able to preserve "a reasonable degree of intimacy with family and friends until the very last" (p. 71). Shorter survivals occurred in patients who, among other things, reported poor social relationships.

Both short-term recovery and survival from breast cancer have also been studied relative to stress, social support and age (Funch & Mettlin, 1982; Funch & Marshall, 1983). In the analysis focusing on short-term recovery (Funch & Mettlin, 1982) the support available to 151 female breast cancer patients who were 3 to 12 months postoperative was studied retrospectively. Three forms of support were considered: social, professional, and financial. According to Funch and Mettlin, social, professional and financial

support were all highly intercorrelated. The only variable significantly related to physical recovery was financial support ($p < .05$).

Objective and subjective stress was considered in the analysis (Funch & Marshall, 1983) that focused on survival from breast cancer. A total of 208 white female breast cancer patients diagnosed between 1958 and 1960 were interviewed at the time of diagnosis and asked to report objective and subjective stress and social support in the five year period preceding their diagnosis. Survival was calculated 20 years later. The authors did not report control of any variable other than stage in this analysis or the one that preceded it (Funch & Mettlin, 1982).

In the findings, reports of life stresses had the strongest association with survival in the youngest age group. No relationship between marital status and number of friends and relatives and survival was found for any age group. For younger and older women in particular, involvement was related to increased survival. In addition, objective stress was related to survival for the oldest group while the relationship in younger women was stronger for subjective stress. For women aged 46-60, neither stress was related to survival.

Socioeconomic status and prognosis

As Wortman (1984) has pointed out, social support and positive outcomes may also be influenced by such factors as social class. She cites the work of Liem and Liem (1978) on the role of economic stress and social support.

Investigations relating cancer survival rates to the economic status of the patient sometimes suggest that poor patients do not do as well as more affluent "private" patients (Berg, Ross, & Latourette, 1977; Cohart, 1954, 1955a, 1955b, 1955c; Liechty, Ziffren, Miller, Collidge, & Den Besten, 1968). As Berg et al. (1977) have pointed out, many important explanations may exist for this relationship. Important variations in treatment may exist as well as differences in when medical help is sought, differences in the general health and life expectancy of the patients, differences in the behaviors of the cancers, and all the cancer host interactions. Clearly, it is likely that socio-economic status is a complex variable representing many interrelated factors.

A series of investigations conducted in the 1950s by Cohart (1954, 1955a, 1955b, 1955c) showed that lower socio-economic status was associated with poorer survival for patients with breast cancer, but not for females with cancer of other genital organs or males and females with cancer of the gastrointestinal or lung. However, data taken from the

Tumor Registry of the University of Iowa Hospitals (Berg et al., 1977) on patients receiving treatment from 1940-1969 was used in an 1977 analysis of economic status and survival and indicated that indigent patients had poorer survival than private patients for every cancer type for which there was data. In this analysis, economic status was measured by the means of payment for care: private payment, clinic pay, and indigent.

Both the race of patients and the stage of illness at the time of diagnosis have been considered as factors in this relationship. There is some indication that blacks and other disadvantaged population subgroups tend to be diagnosed and treated when the disease is already well established, therefore limiting the prognosis. In one report (Linden, 1969) one out of every two cancer patients in private hospitals had localized disease at the time of diagnosis compared with only one in four among public hospital patients. This finding occurred across sites of cancer, sex, and age groups. A similar relationship is suggested by the work of Howard, Lund, and Bell (1980) which revealed that the metastatic rate for black patients with breast cancer was much higher than the rate for white patients. The relationship is also suggested by Huguly and Brown's finding (1981) of a strong relationship between race and socioeconomic status and stage of disease at diagnosis with black and low socioeconomic status in the less favorable diagnostic group.

However, a relationship between socioeconomic status and survival persists even when stage and age are accounted for (Berg et al., 1977; California Tumor Registry, 1963; Lipworth, Abelin, & Connelly, 1970). For example, although indigent patients in one investigation (Berg et al., 1977) had greater delays in seeking medical attention at all ages, survival differences remained even after correcting for delay. Similarly, data from the California Tumor Registry (1963) showed poorer survival among the county hospital patients even when stage and age were taken into account.

Despite the apparent agreement of these findings, contradictory results from reliable sources exist. Noteworthy is a report (Haenszel & Chiazze, 1965) from the National Cancer Institute on the survival rates of cancer sufferers. In this investigation of cancer end-results in several USA cities, no significant differences ($p > .05$) were found in the survival rates of two groups differing in socioeconomic status as determined by the census tracts in which they were domiciled. The findings of Berkman and Syme (1979), based on a nine year follow-up, also suggest that socioeconomic status is not an independent predictor of mortality.

Evaluation and Summary

As in the preceding sections, the evaluation and summary of the findings include a discussion of hypotheses, methodological issues, and a summary of the findings.

Hypotheses and methodological issues

The prospective investigations concerned with social support and mortality reflect the complexity of the concept of social support and the various indices used to represent it. Among the dimensions of social support evaluated in these studies were marriage, contacts with close friends and relatives, church membership, informal and formal group associations, active and passive solitary leisure, perceived social support, professional support (from professional caregivers), and financial support. It has been suggested that social support may have a protective function (Cobb, 1976; Lindsey et al., 1981) through a direct effect on neuroendocrine pathways and/or through indirect effects (Wortman, 1984).

Many of the methodological problems that characterize studies described in the preceding sections were overcome in the large prospective investigations. However, there appears to have been a loss of equal importance in the lack of control for many of the biological variables or physical factors that are known to affect morbidity and mortality.

The investigations concerned with socioeconomic status and mortality also reflect the complexity of this concept and the variety of indices used in its evaluation. In the studies reviewed, socioeconomic status was evaluated by comparing private paying patients with indigent patients, patients in private hospitals with those in public hospitals,

patients residing in various census tracts, and by Hollingshead's (1957) two factor rating of social position. Many explanations have been suggested for this relationship. As previously noted, these include variations in when medical help is sought, in what kind of treatment is given, and differences in the general health and life expectancy of the patients.

Summary of findings

Despite the obvious complexity of the concept and measurement variation, these reports do suggest a relationship between social support and mortality. The findings of studies reviewed suggest an increased rate of mortality for those with little contact with friends and few social connections (Berkman & Syme, 1979), the unmarried (Greer & Morris, 1975), and those reporting poor marital relationships (Greer & Morris, 1975) or poor social relationships in general (Weisman & Worden, 1975). Passive, solitary leisure activities, as opposed to more active solitary leisure activities, were also reported to be associated with higher mortality rates for both men and women (House et al., 1982). Although age has not been found to be a statistically significant factor in patterns of social support (Berkman, 1983), the findings of one analysis of this issue among older individuals (Blazer, 1983) suggest that social support in general is impaired among depressed individuals.

Lower mortality rates were found for married individuals in one investigation (Berkman & Syme, 1979). However, this relationship was not supported by the findings of Funch and Marshall (1983) which showed no significant relationship between survival of breast cancer patients and marital status or the number of friends and relatives reported by patients.

On the other hand, a greater degree of social involvement was associated with lower mortality rates (Berkman & Syme, 1979; House et al., 1982) or longer survival from cancer (Funch & Marshall, 1983; Weisman & Worden, 1975). In the investigation carried out by House et al., intimate social relationships, organizational involvement, and active solitary leisure activities were associated with lower mortality rates among men, while church attendance was associated with lower mortality rates among women.

The studies reviewed concerning the relationship between socieconomic status and survival do not lend themselves to a clear and simple statement of this relationship. Some investigations reported that low socioeconomic status is related to higher mortality rates (Berg et al., 1977; California Tumor Registry, 1963; Cohart, 1955a; Lipworth et al., 1970) or shorter survival (Berg et al., 1977; California Tumor Registry, 1963; Lipworth et al., 1970). The relationship remained even when the stage of the disease and age are considered.

A slightly different aspect of this relationship was addressed by the findings of Funch and Mettlin (1982) regarding the recovery of women from surgery for breast cancer. In this investigation, the only variable that was significantly related ($p < .05$) to physical recovery was financial support.

Berkman and Syme (1979), however, reported that socio-economic status was not an independent predictor and other investigations (Cohart, 1954, 1955b, 1955c; Haenszel & Chiazze, 1965) reported no statistically significant differences in mortality relative to socioeconomic status.

Concluding Remarks

The concluding comments to this review of the literature are intended to highlight the apparently essential features of a varied collection of investigations. As such, considerable liberty is taken in summarizing complicated issues and ideas. For a detailed discussion the reader is referred to the relevant sections of the chapter.

The majority of reports concerned relationships between psychological variables and the development of cancer. These early reports were highly speculative and descriptive in nature and were completly without a unifying theory. As Wellisch and Yager (1983) pointed out, no hypotheses were advanced that specified which personality factors might lead to cancer for what specific reasons.

The most striking features of these reports are the serious methodological problems, the reliance on retrospective analysis and an absence of carefully designed longitudinal studies. In addition, the majority of studies consisted of clinical observations of a small number of patients. Most either lacked a control group altogether or used poorly matched controls. As a result of this very broad and general approach, there was a characteristic failure to control for important epidemiologic factors and a failure to distinguish between patients with various types of cancer and various stages of disease. As regards the information collected on the personality of the patients under study, the ability of the interviewer or the psychological tests to distinguish between trait and state features of the personality was questionable.

At best, the findings of these reports can be said to be associative. There is clearly no direct evidence for a causal relationship between psychological variables and the development of cancer. Among the variables frequently noted by those reporting findings on the characteristics of persons that develop cancer were a loss of a significant relationship or major life change, depression and hopelessness, and restricted hostile or aggressive expression.

The relationship between psychological variables and the progression of cancer has also been explored by a number

of investigations, some of which represent major improvements in design and methodology over the earlier reports. The design and findings of these investigations are of greater importance to the present study. The majority of these were limited to the investigation of certain types and stages of cancer or control for these important prognostic variables by some aspect of the design of the study. The general trend in these investigations was to measure the progression of cancer in terms of the individual's survival. Hence, the findings were most often reported in terms of characteristics of those with longer, or more favorable survival, as opposed to shorter, or less favorable survival.

Investigations that assess emotional expression and attitudes at or around the time of diagnosis reported more favorable, or longer, survival among individuals whose attitude involved a fighting spirit, denial, and/or strong hostile drives without a loss of emotional control. The more favorable outcome was also associated with individuals who showed a recognition of the great demand made on them to adjust to the illness and treatment. On the other hand, individuals with a less favorable outcome were characterized as showing a generally reduced emotional reactivity and a sense of helplessness and hopelessness.

Studies that assessed the emotional states of those with advanced disease reported longer survival for those who

showed a realistic attitude about their illness without a sense of hopelessness or fatalism. Shorter survival, on the other hand, was associated with individuals who expressed a sense of pessimism, conflict, and depression.

In addition, longer survivals were associated with individuals who reported good social relationships and an ability to maintain a sense of intimacy with others even in the terminal phase of the illness. Shorter survivals, conversely, were associated with individuals who reported poor social relationships.

There were a few studies that specifically investigated the relationship between social variables, that is, those related to social support, and the progression of cancer. However, several large prospective investigations suggested a relationship between social support and mortality from various diseases including cancer.

In general, lower rates of mortality were associated with a greater degree of social involvement as measured by the presence of intimate social relationships, organizational involvement, and church attendance. Some differences were reported in the type of involvement associated with lower mortality rates for males and females. Higher rates of mortality were associated with little social involvement as measured by indices including contact with friends, social connections, and poor marital or other social relationships.

There is no clear concensus of findings on the relationship between marital status and mortality rates.

In addition to the various indices of social support that have been investigated, the relationship between socio-economic status and mortality rates has been studied. A greater number of investigations have been carried out relating this variable specifically to the survival of cancer patients. And, although several studies reported that low socioeconomic status was related to increased mortality rates from cancer, additional investigations using other indices of socioeconomic status did not reach similar conclusions.

Finally, in addition to these findings there was some indication that organic factors played an important role as mediating variables in adjustment. That is, adjustment and shorter survival may both be related to disease variables including the duration of prior treatment.

CHAPTER III
METHODS

Introduction

Research concerned with the causes of cancer and the reasons for the progression of the disease has identified certain variables that are clearly related to the survival of individuals with cancer. These include disease variables such as the primary site of the cancer cell and the stage of the disease at the time of diagnosis. Medical variables, such as the treatment given soon after the diagnosis and treatment given later in the illness, also affect survival. However, considerable variability exists even among indivi- duals who are similar in these respects.

It has been suggested that some portion of the remaining variability in survival can be explained by psychosocial variables. And, the findings of several carefully designed investigations lend support to this idea. Certain psychological and social characteristics are associated with longer survival than would be expected, and other characteristics are asociated with shorter survival. In addition, the relationship between disease, medical, and psychological variables is a complicated one. This is illustrated by findings which suggest that the degree and extent of the

illness have a bearing on psychological adjustment and observed psychological characteristics.

The purpose of this study was to explore the relationship between psychosocial variables and the survival of elderly cancer patients when important biological, disease, and medical variables are controlled. This control was achieved by the methods used to determine the survival expected for individuals when these variables are considered. Four research questions were initially posed. They focused on the relationship between psychosocial variables and survival and on the extent to which the variability in survival could be explained by a set of psychosocial variables. In the process of interviewing individuals the influence of two aspects of the illness on the individuals' psychological status was observed. Both the length of time since the diagnosis and the closeness to death at the time of the interview appeared to influence psychological status. Because the research methodology had not adequately controlled for these disease variables, three additional questions were formulated to study the relationships.

The report of the methods of this study begins with the statement of the research questions and hypotheses and a description of the design of the study. These sections are followed by information related to the subjects, instruments, procedure, and data analysis. This information is given in

two parts. The first part pertains to the methods used to determine the expected survival of individuals with cancer of the lung, breast, and rectocolon. The second part pertains to the psychosocial analysis of the patients interviewed. This part includes the methods used to determine relative survival from expected survival and the methods used to test the six hypotheses.

Research Questions and Hypotheses

The relationship between psychosocial variables and survival was considered in four initial research questions. Two questions specifically dealt with the correlations between psychosocial variables and survival. The third concerned the proportion of variability in survival that could be accounted for by a set of psychosocial variables. The fourth question was intended to further clarify the contribution of disease variables to differences in survival. It had to do with the combined effects of a set of psychosocial variables and concurrent physical conditions other than the cancer. This disease variable was called "co-morbidity."

The four research questions were stated as follows:

1. What psychosocial variables are positively correlated with survival?

2. What psychosocial variables are negatively correlated with survival?

3. What proportion of the variability in survival can be explained by a set of psychosocial variables?

4. What proportion of the variability in survival can be explained by a set of psychosocial variables and co-morbidity?

Three additional research questions were formulated during the course of the patient interviews. These dealt with the relationship between three disease variables and certain psychosocial variables being studied. In this instance, the disease variables were treated as the independent variables. Psychosocial variables, which had been independent variables, were treated as the dependent variables.

The first of these three questions dealt with the correlation between co-morbidity and psychosocial variables. The second and third questions focused on variables defined as a result of the observations made during the interviews. The questions were as follows:

5. How are psychosocial variables related to co-morbidity?

6. How are psychosocial variables related to the duration of illness from cancer?

7. How are psychosocial variables related to the individual's closeness to death?

Six null hypotheses were tested in this investigation. They were stated in the following manner:

Hypothesis one: There is no relationship between psychosocial variables and survival.

Hypothesis two: There is no relationship between a set of psychosocial variables and survival.

Hypothesis three: There is no relationship between a set of psychosocial variables, co-morbidity, and survival.

Hypothesis four: There is no relationship between co-morbidity and psychosocial variables.

Hypothesis five: There is no relationship between the duration of illness from cancer and psychosocial variables.

Hypothesis six: There is no relationship between the closeness to death and psychosocial variables.

Design of the Study

This was a prospective study of the psychosocial characteristics of terminal cancer patients and the progression of their disease. The relationship between psychosocial variables and survival was investigated using a correlational design. In addition, the correlations between certain disease variables and psychosocial variables were studied through questions formulated during the course of the study.

The study was designed to clarify the relationship between psychosocial variables and survival by controlling for other variables known to affect survial. The control was achieved by using a value for survival that was based on predictions for each of the cancer sites studied. These predictions were made through the regression of the survival rates of cancer patients on biological, disease, and medical variables.

Part I: Determining Survival Expectations

Subjects

Survival expectations were determined through analysis of information on deceased cancer patients. Three cancer sites were selected for study. They were lung, breast, and rectocolon. These sites were selected on the basis of the relative frequency of their incidence in the general population and their incidence specifically in the elderly population which was the group selected for analysis in this study.

The population

Cancer deaths in the general population are largely from cancers of the lung, breast, or rectocolon. As a result, subjects with cancer of one of these sites are more readily available. Data on deaths in 1978 (National Center for Health Statistics, 1982) revealed that lung cancer was the leading cause of cancer deaths among men. It was the third leading cause among women. Rectocolon cancers were the

second leading cause of mortality from cancer among men and women and breast cancer was the leading cause among women.

Also, deaths from lung, breast, and rectocolon cancer occur most often among older men and women. Table 1 illustrates the age distribution of mortality from these cancer sites. Nearly three-fourths of the deaths from rectocolon cancer occurred among individuals 65 or over. One-half of breast cancer deaths were among those 65 and over. For all three sites, more than 20% of the deaths were among those 75 and older.

Table 1

Age Distribution of Lung, Breast, and Rectocolon Cancer Deaths: U.S.A., 1978

	Cancer Site		
Age in years	Lung %[a]	Breast %[b]	Rectocolon %[c]
35 - 64	45.10	50.24	27.42
65 - 74	34.10	24.36	30.66
75 and over	20.47	23.68	41.21

Note: Percentages for lung and rectocolon cancer reflect males and females combined; breast percentages reflect females only.
Note: Adapted from Vital Statistics of the United States, 1982.
[a] n = 95,086. [b] n = 34,329. [c] n = 53,269.

The sample

In this study survival expectations were determined through an analysis of information on 533 deceased cancer patients who had been diagnosed and/or treated at Halifax Hospital Medical center (HHMC) in Daytona Beach, Florida. The cases for analysis were identified through the hospital Tumor Registry which conducts follow-up on all cancer patients diagnosed and/or treated in the hospital. The prediction for lung cancer was based on 266 cases of lung cancer diagnosed in 1979 and 1980 and included information on all individuals diagnosed in those years who were deceased at the time of data collection. The prediction for breast cancer was based on an analysis of 101 deceased female patients diagnosed in 1976, 1977, or 1978. The group included all patients diagnosed in 1976 and 1977 who were deceased at the time of data collection as well as 20 cases diagnosed in 1978 which were included to reach an adequate sample size. The cases diagnosed in 1978 were randomly selected by including all in a series of 20 from alphabetized records. For cancer of the rectocolon, expected survival was based on an analysis of 166 patients diagnosed in 1977, 1978, or 1979. This group included all deceased patients diagnosed in 1977 and 1978 and 35 cases diagnosed in 1979 which were

included to reach an adequate sample size. A similar sampling approach for the cases diagnosed in 1979 was used for the rectocolon cancers.

The characteristics of the lung, breast, and rectocolon cases are given in Table 2.

Table 2

Summary of Characteristics of the Sample

	Site		
Characteristic	Lung[a]	Breast[b]	Rectocolon[c]
Age			
M	66.33	65.44	71.70
SD	10.01	14.37	10.80
Mdn	67	69	72
Survival			
M	7.56	27.17	17.96
SD	8.11	18.93	17.89
Race			
White	246	91	157
Black	20	10	9
Sex			
Male	190	0	70
Female	76	101	96

[a] *N* = 266. [b] *N* = 101. [c] *N* = 166.

The information on the 266 lung cancer cases was from a group of individuals who ranged in age from 41 to 90 years at the time of diagnosis. One-half were 67 years or older at the time of diagnosis. Their survival ranged from 0 to 43 months after the diagnosis. The distribution of survival values was positively skewed (1.72). These deceased patients represented 89.31% of the lung cancer patients diagnosed in 1979 and 94.30% of all those diagnosed in 1980.

The 101 cases of breast cancer included individuals who ranged in age from 27 to 95 years at the time of diagnosis. The survival of the women in this group ranged from 0 to 77 months. The distribution of breast cancer survival in this group was skewed (0.65) but less so than the survival of those with lung cancer. Of the breast cancer patients diagnosed in 1967, 62.24% were deceased at the close of data collection. Of those diagnosed in 1978, 59.60% were deceased.

The retocolon cancer group included 166 cases of individuals who ranged in age from 46 to 96 years. The survival of these individuals ranged from 0 to 72 months. The distribution of values was positively skewed (1.06). For this site, the deceased cases diagnosed in 197 represented 70.93% of all those diagnosed in that year. Of those diagnosed in 1978, 78.57% were deceased at the close of data collection; 72.73% of those diagnosed in 1979 were deceased.

Instruments

The instrument used in the collection of information for determining survival expectations was a medical abstract. Medical abstracts are used by hospital tumor registries to facilitate follow-up and study of cancer patients. These abstracts are routinely completed by the Halifax Hospital Medical Center (HHMC) Tumor Registry staff on patients diagnosed and/or treated at that facility. Information is drawn from the hospital medical records. The criteria for abstracting information from the medical records are set forth in standard texts and manuals used by tumor registries (American Joint Committee on Cancer, 1983; World Health Organization, 1976).

As a result, little subjective judgement is involved in the process. Although the format of the medical abstract was changed slightly during the period from which the sample was selected, the type of information abstracted and the manner in which it was recorded remained unchanged.

Procedure

Information on cases of lung, breast, and rectocolon cancer from the selected years was coded directly from the medical abstracts to a standard International Business Machines (IBM) coding form. This procedure was carried out in the Tumor Registry of HHMC over approximately 80 hours. Information on the lung cases was coded during January,

February, and March of 1982. Information on the breast and rectocolon cases was coded during April, May, and June of 1984.[1] At this time the abstracts of the lung cases were reviewed to permit addition of those patients who had died since the first data collection period.

The following information was extracted from the medical abstracts specifically for this study: age, sex, race, primary site of cancer, stage of cancer at diagnosis, histology of the cancer, initial treatment, subsequent treatment, and the patient's survival. These data were coded for computer analysis in the following manner:

The patient's age was recorded as the number of years from the date of birth to the date of diagnosis of the cancer. Sex and race were coded as categorical variables with the customary categories for each; that is, male, female; white, black, hispanic, other. The primary sites of lung, breast, and rectocolon were coded numerically. The stage of cancer, an indication of the degree of spread of the disease at the time of diagnosis, was recorded directly from the medical abstract. The staging procedure used for

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[1]The completion of coding was delayed until this time by the patient interviews and by other work-related commitments.

all cases called for the assignment of the values 0 through 9 for the following categories: in situ, local, regional with direct extension, regional with nodal involvement, regional with direct extension and nodal involvement, distant metastasis, lymphoma, and unknown. The histology of the cancer was also coded directly from the histology recorded on the abstract. In order to account for histologies that are found in the cancers of the lung, breast, and rectocolon, the following categories were included: epidermoid, large cell, adenocarcinoma, small cell, inflammatory, mesothelial, and spindle cell. The coding for initial treatment and subsequent treatment was devised to reflect the combination and sequence of treatments given. Treatments begun during the first four months following the date of diagnosis were classified as initial treatments. New treatments begun subsequent to that period were classified as subsequent treatments. Four types of cancer treatment, surgery, radiation therapy, chemotherapy, hormonal therapy, and all possibilities of these in combination and sequence as given in medical practice were used as categories for initial or subsequent treatment. Finally, the patient's survival was measured from the date of diagnosis to the date of death and the number of months was recorded.

Analysis

The determination of survival expectations involved the development of three linear regression equations that were used to predict the survival of individuals with cancer of the lung, breast, or rectocolon.

The development of the equations included the analysis of three separate sets of data, each of which consisted of biological, medical, and disease information on one of the three cancer sites being studied. As previously noted, these analyses were based on 266 cases of lung cancer, 101 cases of breast cancer, and 166 cases of rectocolon cancer. The data were derived exclusively from the medical abstracts. Table 3 summarizes the variables identified for this analysis and gives the scale of measurement of each.

Table 3

Predicting Survival: Independent and Dependent Variables

Variables	Scale of Measurement
Independent	
Age	Continuous
Sex	Categorical
Race	Categorical
Stage	Continuous
Histology	Categorical
Initial treatment	Categorical
Subsequent Treatment	Categorical
Dependent	
Survival	Continuous

Descriptive study

Eight variables were treated as independent variables in these analyses. For the purpose of this study, age, sex and race were included as biological variables, stage and histology were included as disease variables, and initial and subsequent treatment were included as medical variables.

Descriptive information was obtained on the eight variables for each cancer site in order to compare the important characteristics in these groups with the characteristics of individuals interviewed for the psychosocial analysis. Measures of central tendency and dispersion were obtained for continuous variables and the frequency distribution of values on categorical variables was studied. Special attention was paid to the distribution of values on each of the variables intended for use as independent variables in the regression analysis.

The analysis of the data for the three cancer sites also permitted evaluation of the distribution of the variable survival, this being the variable intended for use as the dependent variable in the regression analysis. The survival of individuals with cancer is known to be skewed, more so for some sites than others. As previously noted, this was reflected by the data for lung, breast, and rectocolon cancer. In the final regression equations selected for prediction, the natural logarithmic transformation of

survival was used as the dependent variable to normalize the distribution of values on that variable.

Inferential study

The inferential study of these variables consisted of a series of regression analyses. In the first series of regression analyses two linear models were tested for each of the three cancer sites. These analyses were exploratory in nature. The levels of statistical significance of the partial regression coefficients of the independent variables in these analyses were used as a criteria for the development of equations for prediction.

The first of these two linear models included only the main effects of the independent variables. The second linear model included main effects and selected interaction effects. Table 4 summarizes the variables used in the regression analysis using the main effects only and the analysis using main and interaction effects.

The regression analyses using the variables listed in the table were carried out in an identical manner for each of the three cancer sites with one exception. Since all cases in the breast cancer group were female, the variable sex was dropped as an independent variable for that site.

The second series of regression analyses involved tests of regression equations for each cancer site that included combinations of the independent variables that appeared to be

Table 4

Variables Tested in Two-Series Regression Analysis: All Sites

Variables	Series One	Series Two
Independent		
Age	+	+
Sex	+	+
Race	+	+
Stage	+	+
Histology	+	+
Initial treatment	+	+
Subsequent treatment	+	+
Age x Stage		+
Age x Histology		+
Age x Initial Treatment		+
Age x Stage		+
Race x Stage		+
Stage x Initial Treatment		+
Age x Stage x Initial Treatment		+
Dependent		
Survival	+	+

the best predictors of survival. In these analyses the natural logarithmic transformation of survival was used as the dependent variable. One equation was subsequently selected for each site to predict survival.

Four regression equations were developed for the lung cancer cases. Table 5 summarizes the variables that were used in these equations.

Two of the equations these included main effects only and two included main effects and one interaction effect. An

Table 5

Regression Equations for Lung Cancer: Independent and Dependent Variables

	Model			
Variables	1	2	3	4
Independent				
Age	+	+	+	+
Stage	+	+	+	+
Histology		+		+
Initial treatment	+	+	+	+
Subsequent treatment	+	+	+	+
Stage x Treatment			+	+
Dependent				
Log survival	+		+	+

evaluation of the overall significance of the prediction equation, the value of R^2, the values of p for the partial regression coefficients, and the number of independent variables in the regression coefficients, and the number of independent variables in the equation were used to select one equation for use in predicting the survival of the lung cancer patients interviewed for the psychosocial analysis.

The regression equations were tested for the breast cancer cases. The variables used in these equations are summarized in Table 6.

The equations included only main effects of the independent variables being tested. An evaluation of the equations as reported for the lung cancer cases was used

to select one of the two models for use in predicting the survival of breast cancer patients who were interviewed.

Table 6

Regression Equations for Breast Cancer: Independent and Dependent Variables

	Model	
Variables	1	2
Independent		
Stage	+	
Subsequent treatment	+	+
Dependent		
Log survival	+	+

Table 7 summarizes the variables tested in three regression analyses of the rectocolon cancer cases.

Table 7

Regression Equations for Rectocolon Cancer: Independent and Dependent Variables

	Model	
Variable	1	2
Independent		
Sex		+
Stage	+	+
Dependent		
Log survival	+	+

Two of the equations included only main effects of the independent variables; one included main effects and one one-way interaction effect. These equations were evaluated and one of the three was selected for prediction of the survival of rectocolon cancer patients interviewed.

Part II. Psychosocial Analysis

This section of the chapter pertains to the psychosocial analysis and includes a report of the methods used to answer the seven research questions. The psychosocial analysis was based on interviews with 30 elderly cancer patients and involved study of the relationships between psychosocial, medical, and disease variables. Information is reported in four major sections under the headings of subjects, instruments, procedure, and analysis.

Subjects

The subjects in the sample for psychosocial analysis were drawn from all individuals who were receiving treatment for cancer at HHMC over a one-year period. Several criteria were used to select subjects for study. The first was that the patient have cancer primary to the lung, breast, or rectocolon. Second, the patient must have been sixty or above above at the time of the data collection. The vast majority of patients with cancer of the lung, breast, or rectocolon who receive terminal care at HHMC are at least 60 years of age. This criterion was used to exclude the very few

individuals of a younger age who would have been in this sense, exceptional in a way that could not be adequately evaluated. Third, the patient must have had a prognosis of six months or less as judged by his or her primary physician.

The patients who met these criteria were identified by the HHMC Oncology Resources Coordinator who routinely screens all cancer patients admitted to the inpatient unit and by the registered nurses staffing the outpatient chemotherapy unit. Information on the patients identified for study was obtained from the third week in February, 1982, through February 1, 1983. With the exception of a week each in March, April, October, November, and two weeks in August, this information was obtained through weekly visits to HHMC through November of 1982. The number of visits each week ranged from one to three. The information was obtained by phone during December 1982 and January 1983. As information was obtained, initial visits in the inpatient or outpatient unit were scheduled.

A total of 57 patients were referred for study. Of these 2 were contacted but declined to participate, 6 were contacted but judged to be too ill to complete the interview, 2 were contacted but proved to have hearing impairments that prevented clear communication, and 14 were discharged from the facility before interviews could be scheduled. The remaining 33 patients were interviewed for the psychosocial analysis. Two of these were subsequently

dropped from the sample when it was determined that their primary cancer site was not one of the three under study. One of the patients interviewed remained alive more than 12 months after the collection of data and was not included in the analysis.[1]

The final sample consisted of 30 subjects. Twelve had cancer primary to the lung, 12 were women with cancer of the breast, and 6 had cancer of the rectocolon. Of those patients with cancer of the lung, eight were male and four were female. All were white. Their ages at the time of the interviews ranged from 60 years to 83 years with an average of 66.67. All breast cancer patients interviewed were females. Their ages ranged from 60 years to 84 years with an average of 62.67 years. Of those patients with rectocolon cancer, four were male and two were female. One of the patients was black; the others were white. Their ages ranged from 61 to 82 years with an average of 69.33 years.

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[1] The duration of this patient's survival from diagnosis to referral to study was no longer than the survival of nearly one-fourth of the cases with the same primary site. It was decided on this basis that the case did not represent exceptionally long survival but rather, inappropriate referral to the study.

Table 8 summarizes the development of the study group.

Table 8

Development of the Sample for Psychosocial Analysis

Date	No. of Visits to Study Location	Number Accessioned	Mortality Rate[a]
02/82 - 03/82	14	6	1
04/82 - 05/82	13	7	1
06/82 - 07/82	14	5	5
08/82 - 09/82	10	4	7
10/82 - 11/82	12	6	3
12/82 - 01/83	2	1	4
02/83 - 03/83	1	1	3
04/83 - 05/83			2
06/83 - 07/83			
08/83 - 09/83			
10/83 - 11/83			
12/83 - 01/84			
02/84 - 03/84			2
04/84 - 05/84			

[a] One patient remains alive.

Instruments

The instruments used for the psychosocial analysis were either selected or developed to gather several kinds of

information on the subjects. The greatest part of that information was psychosocial in nature. However, biological, medical, and disease information was also collected. The following description of the instruments used in the study is given in sections as it relates to the type of information collected.

Psychosocial information

The interview. Psychosocial information was collected from the sample through semi-structured interviews. The interview questions, included as Appendix A, were asked to elicit information in eight areas including (a) perception of the illness, (b) expections for treatment and for the future, (c) perception of ability to affect change in the situation, (d) extent and type of emotional distress, (e) degree of physical exhaustion, (f) perception of relation- ships with others, (g) living arrangements and family in the area, and (h) socioeconomic status. The interview questions were developed to be asked in the order in which they are listed. Several were adapted from the interview questions suggested by Weisman (1974). There was no available evidence of the reliability or validity of the psychosocial interview.

Index of Vulnerability. Most of the information from the interviews was organized through the use of an instrument called the Index of Vulnerability (Weisman, 1974). This clinical rating scale was designed to yield information on

the type and degree of distress of terminal cancer patients. The index is included as Appendix B in the format presented by Weisman, Worden, and Sobel (1980).

The Index of Vulnerability calls for numerical ratings on 13 vulnerability scales including hopelessness, turmoil, frustration, depression, powerlessness, anxiety, exhaustion, worthlessness, abandonment, denial, truculence, repudiation of key others, and time perspective. Numerical ratings for the overall scale can, therefore, range from 13 to 52.

According to Weisman et al. (1980), the term vulnerability refers to (a) distressing emotion, such as frustration, anxiety, or turmoil, (b) disposition to behave in ways typical of that emotion, and (c) distress signals indicative of an emotional state, such as weeping, pallor, palpitations, and so forth. The authors point out that "whenever a clinician draws a conclusion about vulnerability the judgement is based both on what a patient says or does, and on what the clinician observes and infers about the emotion, problem, and major strategies" (p. 11).

The interrater reliability coefficients reported in Weisman et al. (1980) ranged from a low of .64 for the powerlessness scale to a high of .92 for the truculence scale. The reliability of the overall index was .95. For the purpose of the present study, the four point continuum of each vulnerability scale was divided into increments of .5

units. The scales were broken down in this way because the patients' psychosocial status was not adequately captured in evaluation by the four categories of the continuums. No data were on the reliability of the index with the alteration was available.

Three groups of vulnerability scales were selected for additional study. Each of these clusters consisted of the combined evaluation of three of the scales from the index. They were selected and grouped on the basis of the relationships that appear to exist between these psychosocial states. However, no estimates of the reliability of the clusters were available.

The Index of Social Position. Information collected in the interview on education and occupation was combined to form a measure of socioeconomic status according to the methods set forth by Hollingshead (1957) for the Two Factor Index of Social Position. Scale scores for occupation and education were based on (a) the occupation of the head of the household and (b) the amount of formal schooling he or she had received. If the head of the household was retired or deceased, the occupation of that person prior to retirement or death was used.

The first factor, occupation, was scaled according to a system of scores developed by the author. Education was scaled according to seven categories. The two factors were combined by weighing the individual scores from the scale positions with weights determined by multiple correlation

techniques (Hollingshead, 1957). The social position scores were then divided into a hierarchy of score groups as suggested by Hollingshead. This resulted in the assignment of each subject to one of five socioeconomic classes.

Biological, medical, and disease information

Two instruments were used for the collection of biological, medical, and disease information. The first was the medical abstract completed by hospital Tumor Registry staff. This medical abstract was discussed in Part I of this chapter.

The Index of Co-Morbidity. The second instrument was one developed specifically for use in this study to yield a measure of "co-morbidity." It is included as Appendix C. Each subject's primary physician was asked to complete this rating scale after the patient's death. The scale provided an estimate of the degree to which existing and pre-existing medical conditions other than cancer contributed to the patient's survival.

The scale called for a rating of (a) the extent to which conditions of the nine major body systems may have contributed to or hastened the patient's death, and (b) the extent to which conditions of the nine major body systems may have negatively influenced the effectiveness of treatment for the cancer. Each response was given in terms of very much,

a little, or not at all. These responses were subsequently assigned values of two, one, and zero respectively. The sum of values for each of the 18 responses was taken as the measure of co-morbidity.

The development of this scale for this study was based on the premise that physical conditions other than cancer often play an important role in the morbidity and mortality of cancer patients. However, information about these conditions is generally not included in studies of important medical and disease variables in the survival of cancer patients. In this case, this information was not available on the cases of deceased cancer patients and could not, therefore, be studied along with other disease variables through the regression analysis used to determine survival expectations.

The Index of Co-Morbidity was based on a clinical evaluation of the patients' health by their primary physician and, as such, a good deal was left to the judgement of each physician. No arrangements were made with the physicians involved for a cross-evaluation of the sample, and as a result, the error variance from interscorer differences was not evaluated.

The organization of data

All information collected on the subjects in the sample was recorded in a code book. This is included as Appendix D.

Procedure

The procedure used to gather information for the psychosocial analysis began as patients were identified and screened for inclusion in the sample. As this information was obtained, initial visits in the inpatient or outpatient unit were made. During these visits, a brief description of the purpose of the project was given, and with the patients' consent, the semi-structured interview was conducted. The patient consent form is included as Appendix E. On several occasions, subjects were unable to complete the interview in one session and a second visit was made the following day for that purpose. Immediately following the interview, the Index of Vulnerability was completed. Values on the 13 vulnerability scales and other information relevant to the study were then recorded in the code book.

Through the tenth month of the year of interviewing patients, notification was given by the HHMC staff of subsequent admissions of the subjects who had been inteviewed. Additional visits were made during which vulnerability was again evaluated. The Index of Vulnerability was completed following the visit and the scale scores and date of the visit were recorded in the code book.

Notification of the death of subjects in the sample was given by (a) HHMC staff or (b) through follow-up conducted by the Tumor Registry. At that time, medical and disease

information was obtained from the Tumor Registry medical abstracts. Periodically the primary physicians whose patients were included in the sample were sent copies of the Index of Co-Morbidity along with a request for return by mail for their patients who had died. Like the psychosocial data, the medical and disease information was recorded in the code book.

The information in all code books was subsequently transferred to IBM code sheets in preparation for computer analysis.

Analysis

The psychosocial analysis involved two series of correlation studies. The purpose of the first series was to explore the relationship between psychosocial variables and survival, and to test hypotheses one, two, and three. The second series dealt with the relationship between disease variables and certain psychosocial characteristics. This series tested the fourth, fifth, and sixth hypotheses.

The value for survival used in these correlation analyses was a measure of relative survival based on a comparison of expected survival and observed survival. The following report of the psychosocial analysis includes information related to the analysis for hypothesis testing and the procedure used to determine relative survival.

Psychosocial variables and survival

The independent variables. The relationship between psychosocial variables and survival was explored by correlating psychosocial variables with the survival quotient that had been calculated for each individual in the sample. Fourteen of the psychosocial characteristics treated as independent variables were drawn directly from the scales of the Index of Vulnerability. These variables are listed in Table 9.

Table 9

Independent Variables Drawn from Scales of the Index of Vulnerability

Variables
Hopelessness
Turmoil
Frustration
Depression
Powerlessness
Anxiety
Exhaustion
Worthlessness
Abandonment
Denial
Truculence
Repudiation of key others
Time perspective
Total vulnerability

Note. The scale of measurement of all variables listed in the table was continuous.

With the exception of total vulnerability which could range from 13 to 52, all of these independent variables could range from 1 to 4 in increments of .5. A description of each scale on the continuum from one to four is given on the Index of Vulnerability included as Appendix B.

Three additional independent variables were developed from clusters of vulnerability scales. These variables were named Cluster One, Two, and Three. The scales included in the clusters are listed in Table 10.

Table 10

Independent Variables Developed from Clusters of Vulnerability Scales

Independent variables	Vulnerability scales included
Cluster One	Hopelessness, depression, powerlessness
Cluster Two	Turmoil, frustration, anxiety
Cluster Three	Abandonment, repudiation, truculence

Cluster One was constructed from an evaluation of the degree of hopelessness, depression, and powerlessness indicated by comments or responses to questions concerning the possibility of recovery from cancer, the attitude about that belief, and the attitude about the plight in general.

Values for this variable ranged from 3 to 12. Cluster Two was constructed from an evaluation of the extent of emotional distress expressed by the individual and was defined by the scales for turmoil, frustration, and anxiety. Cluster Three was constructed from the individual's perception of social support defined by expression of a sense of abandonment, repudiation of key others, and truculence. Values for Cluster Two and Three also ranged from 3 to 12.

Three of the independent variables tested in the psychosocial analysis were indices of social support. These are listed in Table 11.

Table 11

Independent Variables Drawn from Structural Indices of Social Support

Variables
Marital status
Living arrangements
Number of family members living in the area

Note. The scale of measurement of all variables listed in the table was categorical.

Marital status was evaluated at the time of the initial visit in terms of the following categories: widowed, single, separated/divorced, and married. Living arrangements

referred to those immediately preceding the hospitalization. These were categorized as living alone; living with spouse, children, or with members of the family; and living with friends. The number of family members living in the area referred to the number of relatives living in a 50 mile radius of the hospital. This number was grouped as follows: none, one through three, four through six, and seven or more.

In addition to the 20 variables described above, socioeconomic status and co-morbidity were both treated as independent variables in this part of the correlation analysis.

Prior to the correlation analysis, the categorical variables were transformed into dichotomous variables to permit a clearer analysis between the dependent variable, which was continuous, and these psychosocial variables. Two levels of marital status were created such that level one included widowed, single, and separated/divorced, and level two included married. The two new levels of living arrangements were (a) alone and (b) with relatives or friends. The two new levels reflecting the number of family members in the area were (a) none and (b) one or more. Based on the characteristics of the five classes of socioeconomic status (Hollingshead, 1957) and the distribution of cases on this variable, socioeconomic status was treated as a dichotomous variable such that level one included classes I, II, and III, and level two included classes IV and V.

The dependent variable. The dependent variable in this series of correlation analyses was the measure of relative survival called the survival quotient. Because this measure was based on a comparison of predicted survival and observed survival, this step of the analysis was not carried out until all of the individuals interviewed had died.

The procedure used for the calculation of relative longevity was drawn from the work of Worden, Johnston, and Harrison (1974) and results in a measure of survival termed the "survival quotient." According to Weisman and Worden (1975) the procedure can be summarized as follows:

$$\text{Survival Quotient} = \frac{\text{Observed Survival minus Expected Survival}}{\text{Standard Error of Estimate}}$$

Where

Observed Survival = number of months from diagnosis until death

Expected Survival = survival in months predicted by regression equations

SE_{est} = standard error of estimate for the particular site of the case being evaluated

The survival quotient was derived through three computational steps. First, the expected survival of each of the individuals interviewed was determined through the prediction equation for the particular cancer site. Second, the natural log of the observed survival of the individual was found. Finally, a survival quotient was calculated for each of the individuals using the appropriate standard error of estimate. Values greater than zero represented longer survival than expected and values less than zero represented shorter survival than expected.

Descriptive study. Descriptive information on the independent and dependent variables was obtained. This included measures of central tendency and dispersion for the continuous variables and the frequency distribution of values on categorical variables.

Inferential study. The inferential study of these variables consisted of a series of correlation analyses to address Hypotheses One, Two, and Three. All hypotheses were tested at the .05 level.

Hypothesis one called for testing the correlations between the psychosocial variables and survival, as measured by the log value of the survival quotient. The Pearson product-moment correlation coefficients were computed and the value, direction, and significance of each were evaluated.

Hypotheses two and three were concerned with the proportion of variability in survival that can be accounted for by (a) psychosocial variables and (b) the combined effects of psychosocial variables and co-morbidity. Both hypotheses were tested for the sample of patients interviewed through regression analyses using the log value of the survival quotient as the dependent variable and the selected psychosocial variables and co-morbidity as the independent variables.

Disease variables and psychosocial status

The independent variables. The relationship between three disease variables and selected psychosocial variables was studied by correlating three disease variables, two developed during the study, with the 13 vulnerability scales and total vulnerability. These variables are listed in Table 12.

Table 12

Disease Characteristics Used as Independent Variables

Variables
Co-morbidity
Duration of time since diagnosis
Closeness to death

Note. All independent variables listed were continuous.

The reader may refer to pages 97 and 98 for a discussion of the variable co-morbidity as it was derived from the Index by the same name. The duration of time since diagnosis referred to the number of months that had lapsed between the date of diagnosis of the cancer and the date of the initial interview with the subject. Closeness to death referred to the number of months that elapsed between the date of the initial interview and the date of the subject's death.

The dependent variables. In order to study the relationship between these disease variables and the patient's psychological status, the 13 vulnerability scales and total vulnerability were treated as the dependent variables in this analysis. These variables have been enumerated in previous sections; the reader may refer to Table 9 for a complete listing.

Descriptive study. Descriptive information on the duration of time since diagnosis and the closeness to death was obtained on the subjects. Measures of central tendency and dispersion were included. Similar descriptive information was obtained for the variable co-morbidity and information on the psychosocial variables was reviewed.

Inferential study. A series of correlation analyses were carried out to address Hypotheses four, five, and six. These hypotheses dealt with the relationship between the disease variables and psychological status. The reader may

refer to the statement of the hypotheses on page 75. In all cases, the Pearson product-moment correlation coefficient was calculated for each disease variable and the psychosocial variables. Although the value, direction, and significance of each was noted, the focus of the evaluation was on the pattern of relationships that emerged when psychosocial variables were viewed as the outcome of certain disease variables rather than as the predictors of survival.

Limitations

The limitations of the study included an issue related to the sampling procedure used for the analysis to determine survival expectations and several issues related to the psychosocial analysis. The limitations of the study were as follows:

1. In the determination of survival expectations the samples for each of the three cancer sites did not include all patients diagnosed in the years selected for study. Some of the patients diagnosed in the selected years were still living at the end of the data collection period.

2. The size of the sample of patients interviewed for the psychosocial analysis was small ($N = 30$). Some of the patients referred to the study were too ill to participate in the interview. Others were discharged before the interview could be scheduled.

3. No information was available on the psychosocial status of patients prior to the cancer diagnosis. All information on the psychosocial variables related to the terminal period of the illness.

4. The method of psychosocial evaluation relied solely on an interview process and did not include psychological testing to evaluate trait features of the personality. Consequently, the measurement of the variables that were studied was based on clinical evaluation alone.

5. Information concerning the reliability and validity of the psychosocial interview and the Index of Co-Morbidity was not available.

CHAPTER IV
RESULTS

Introduction

The clarity of findings regarding the influence of psychosocial variables on the survival of cancer patients is largely dependent on the methods used to consider biological, medical, and disease variables that are known to influence survival. This study demonstrates the usefulness of regression analysis of biological, medical, and disease variables to determine the survival that can be expected for patients with certain types of terminal cancer. The results of the study illustrate a trend in the relationship between psychosocial variables and survival that is longer or shorter than expected. However, the findings also lend support to the idea that the psychosocial characteristics evaluated as predictors of survival may, in fact, reflect the degree to which the patient is ill at the time of the evaluation and conceivably, how ill they have been through the course of the disease.

The results of the study are reported in two sections. The first section, Determining Survival Expectations, discusses the development of prediction equations for each of the three cancer sites included in the study. The second

section, Psychosocial Analysis, includes the results of the prediction of survival for the 30 individuals who were interviewed and the calculation of a survival quotient for each. The report of findings regarding the relationship between psychosocial variables and survival follows this. The section concludes with the results of the analysis pertaining to the influence of disease variables on psychosocial status.

Determining Survival Expectations

The linear regression equations used to predict the survival of the individuals who were interviewed were developed from separate sets of data on patients with cancer of the lung, breast, and rectocolon. The findings of these analyses are, therefore, presented in sections for each of the three cancer sites.

Lung Cancer

The first step in the development of a regression equation for the prediction of survival of the 12 lung cancer patients entailed two exploratory regression analyses using general linear models. In the first, the main effects of seven biological, medical, and disease variables were used to predict survival. In the second, the main effects of the independent variables and selected interaction effects were studied.

The first analysis used age, sex, race, stage, histology, initial treatment, and subsequent treatment as independent variables. The number of months from diagnosis to death was the dependent variable. Because of the exclusion of cases with missing values for stage or histology, the analysis was of 221 of the 266 cases in the sample. A comparison of values on all variables revealed only slight differences between the sample of 266 and the group of 221. A detailed comparison of the values on all variables for this site and the other two cancer sites is given as Appendix F. The regression was significant with F (28,192) = 3.23, p = .0001. The multiple correlation coefficient was .57 and its square was .32.

The results of partial regression were used to evaluate the predictive efficacy of each independent variable. Table 13 summarizes these results.

Table 13

Regression Analysis of the Main Effects of Independent Variables for Lung Cancer

Variable	df	F	p
Age	1	4.38	.0376
Sex	1	0.24	.6240
Race	1	0.57	.4522
Stage	7	2.99	.0054
Histology	4	1.39	.2395
Initial treatment	11	1.95	.0357
Subsequent treatment	3	4.87	.0029

The regression coefficients for four variables were significant at the .05 level. These included age, stage, initial treatment, and subsequent treatment. The partial regression coefficient of the variable histology was not significant at the .05 level. It was, however, retained as a variable for further study because of other findings that suggest its importance as a prognostic indicator.

The second regression analysis used as independent variables age, sex, race, stage, histology, initial treatment, and subsequent treatment and also included the following interactions: Age x Stage, Age x Histology, Age x Initial Treatment, Age x Subsequent Treatment, Race x Stage, Stage x Initial Treatment, and Age x Stage x Initial Treatment.

The regression was significant with $\underline{F}$ (79, 141) = 1.83, $\underline{p}$ = .0009. The multiple correlation coefficient was .71 and $\underline{R}^2$ = .51. None of the partial regression coefficients for the interaction effects were significant at the .05 level. However, because considerable differences do exist between the type of treatments offered patients depending on the stage of their disease, and consequently differences do exist in their survival, the interaction between stage and initial treatment was retained for evaluation in a subsequent linear model.

The findings of the exploratory regression analysis of the main effects and the one of main and interaction effects were used to select a fewer number of variables for use as independent variables in four additional regression analyses. The variables selected were age, stage, histology, initial treatment, subsequent treatment, and the interaction of stage and initial treatment. At this point in the analysis, the dependent variable was transformed by taking its natural log; that is, the natural log of survival. This procedure was carried out in order to correct for the skewed distribution of this variable.[1]

Four regression models were studied in this series of analyses. In the first age, stage, initial treatment, and subsequent treatment were used as independent variables. The regression analysis was based on 214 of the sample of 266. Cases excluded were those with missing values for stage and cases with zero months survival. A comparison of the group of 214 cases to the sample of 266 is given in Tables 37 - 41, Appendix F.

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[1] Because the natural log of zero cannot be computed, all cases with less than one month of survival, which were coded as zero months, were excluded from the regression analysis. Since the model used for prediction was not used to predict any cases with less than one month survival, this approach was deemed acceptable.

The F Ratio for the model was significant F (23,190) = 4.23, p = .0001 . The value of R^2 was .34. The F ratios for the partial regression coefficients of each of the four independent variables were also significant at the .05 level.

The second regression model used age, stage, histology, initial treatment, and subsequent treatment as independent variables. In addition to the cases excluded in the analysis of the first model, cases with a missing value for the variable histology were excluded. The resulting number for analysis was 197.

This model was also significant with F (26,170) = 3.36, p = .0001. The value of R^2 = .36. With the exception of histology (p = .2599) the partial regression coefficients for the independent variables were significant at the .05 level.

The third model used as independent variables four main effects (age, stage, initial treatment, and subsequent treatment) and one interaction, that of Stage x Initial Treatment. The analysis was based on 214 cases.

This regression model was also significant F (43,170) = 2.98, p = .0001 . The squared multiple correlation coefficient was equal to .43. The interaction was not significant (p = .1491).

The last regression model included as independent variables age, stage, histology, initial treatment,

subsequent treatment, and the interaction of Stage x Initial Treatment. The analysis was based on 197 cases.

This model was also significant with F (46,150) = 2.73, p = .0001 and R^2 = .46. The partial regression coefficients for age, stage, and subsequent treatment were significant at the .05 level. Those for histology, initial treatment, and the interaction of Stage x Initial Treatment were not.

The comparison of the regression models resulted in the selection of model one for use in predicting the survival of lung cancer patients who were interviewed for the study. Table 14 summarizes the regression analysis of model one which included four independent variables: age, stage, initial treatment, and subsequent treatment.

Table 14

Regression Analysis of Lung Cancer Cases: Model One

Source	df	F	P
Model	23	4.23	.0001
Age	1	6.32	.0127
Stage	7	3.49	.0016
Initial treatment	12	2.37	.0074
Subsequent treatment	3	5.19	.0019
		R^2 = .3388	

The following regression equation was used for prediction:

$$\hat{y} = 3.43 + [(-0.02)\ \text{age}] + [(0.25)\ \text{in situ} + (1.03)\ \text{local} + (0.01)\ \text{regional/direct} + (0.26)\ \text{regional/nodes} + (0.64)\ \text{direct/nodes} + (-0.06)\ \text{regional, NOS} + (0.66)\ \text{non-local}] + [(-1.30)\ \text{none} + (-0.35)\ \text{surgery} + (-0.85)\ \text{radiation} + (-0.61)\ \text{chemotherapy} + (-0.36)\ \text{surgery, radiation} + (-0.21)\ \text{surgery, chemotherapy} + (-1.04)\ \text{surgery, chemotherapy, radiation therapy} + (-0.23)\ \text{surgery, radiation, chemotherapy} + (-1.16)\ \text{radiation, chemotherapy} + (-0.46)\ \text{chemotherapy, radiation} + (-0.59)\ \text{chemotherapy, hormonal} + (-1.13)\ \text{radiation, hormonal}] + [(-0.15)\ \text{none} + (0.31)\ \text{radiation} + (0.93)\ \text{chemotherapy}]$$

The variable age was continuous in this equation. The levels of the other three variables were coded as ones and zeros in the analysis. For illustrative purposes, the values of $\underline{b}$ for the levels of each independent variable are contained in brackets in the statement of the equation. In order to predict an individual's survival, the appropriate values of $\underline{b}$ for their age, stage of cancer, initial treatment, and subsequent treatment were summed and added to the value for the intercept. For example, the prediction equation for a 65 year old individual with local disease who received surgery initially and chemotherapy at a later time would be as follows:

$$\hat{y} = 3.43 + (-0.02)(65) + (1.03) + (-0.35) + (0.93)$$

Breast Cancer

The development of a regression equation for the prediction of the survival of breast cancer patients also initially involved exploratory regression analysis of two models, one with the main effects of independent variables and one with main and interaction effects. Both regression analyses were based on 96 cases of the original sample of 101. The cases excluded were those with missing values for histology and/or stage. As for the lung sample, a comparison of the distribution of values on all variables revealed only slight differences between the two groups. A comparison of the group of 96 to the sample of 101 is given in Tables 42-46, Appendix F.

The first analysis used age, race, stage, histology, initial treatment, and subsequent treatment as the independent variables. The dependent variable was survival; that is, the number of months between the diagnosis and death. The regression was significant with F (36,59) = 2.28, p = .0024 and R^2 = .58.

The predictive efficacy of each independent variable was evaluated through partial regression analysis, the results of which are summarized in Table 15.

Table 15

Regression Analysis of the Main Effects of Independent Variables for Breast Cancer

Variable	df	F	p
Age	1	0.49	.4885
Race	1	2.01	.1611
Stage	4	2.11	.0912
Histology	2	0.73	.4840
Initial treatment	15	0.98	.4909
Subsequent treatment	13	2.93	.0025

Of the independent variables tested, only the main effect of subsequent treatment was significant [F (13,59) = 2.93, p = .0025]. The variable stage was also retained for further study because of the relatively low value of p.

The second regression analysis included the same six main effects as well as the following interactions: Age x Stage, Age x Histology, Age x Initial Treatment, Age x Subsequent Treatment, Race x Stage, Stage x Initial Treatment, and Age x Stage x Initial Treatment. This regression model was not statistically significant (p = .0586) and none of the interactions tested were significant at the .05 level.

These findings were used to develop two additional regression models with fewer independent variables. As noted previously for the lung cancer cases, at this point the dependent variable was transformed by taking its natural log.

The first model used stage and subsequent treatment as the independent variables. Table 16 summarizes the results of the analysis.

Table 16

Regression Analysis of Breast Cancer Cases: Model One

Source	df	F	P
Model	17	3.77	.0001
Stage	4	5.45	.0006
Subsequent treatment	3	2.72	.0032
			R^2 = .4509

The regression model was significant with F (17,78) = 3.77, p = .0001. The value of R^2 = 45. The partial regression coefficients for both stage and subsequent treatment were significant [F (13,86) = 2.27, p = .0126]. The value of R^2 was .26.

Model one was selected for use in predicting the survival of breast cancer patients who were interviewed. The following regression equation was used.

$\hat{y}$ = 2.52 + [(1.42) local + (0.70) regional/direct + (0.66) regional/nodes + (0.76) direct/nodes] + [(-0.39) none + (0.61) radiation + (0.50) chemotherapy + (0.50) radiation, chemotherapy + (0.41) radiation, surgery, chemotherapy + (0.58) hormonal, chemotherapy + (0.54) hormonal, radiation + (0.69) hormonal, radiation, chemotherapy + (0.35) chemotherapy, hormonal + (0.75) radiation, hormonal]

The levels of stage and subsequent treatment were coded as ones and zeros in the analysis. For illustrative purposes, the values of b for the levels of these independent variables are contained in brackets.

Rectocolon Cancer

As in the previous cases, the development of a final prediction equation for rectocolon cancer began with two exploratory regression analyses; one of a model with main effects only and one with main and selected interaction effects. Both analyses were of 156 of the sample of 166 due to the exclusion of cases with missing information pertaining to histology and/or stage. Once again, a comparison of the distribution of values on all variables revealed only slight differences between the two groups. This comparison is given in Tables 47-51, Appendix F.

The first regression model included the main effects of age, sex, race, stage, histology, and initial and subsequent treatment. The dependent variable in the analysis was survival. The results of this analysis are reported in Table 17.

The regression was significant F (20,135) = 2.56, p = .0007 with R^2 = .28. Based on the significance levels of the partial regression analyses, two independent variables were retained for further study. These were stage and sex.

Table 17

Regression Analysis of the Main Effects of Independent Variables for Rectocolon Cancer

Source	df	F	p
Model	20	2.56	.0007
Age	1	2.45	.1196
Sex	1	3.12	.0797
Race	1	0.66	.4197
Stage	5	4.46	.0009
Histology	1	0.19	.6602
Initial treatment	6	0.66	.6831
Subsequent treatment	5	0.74	.5971
		R^2 = .2752	

The second regression analysis of the rectocolon cancer cases included the same seven main effects and the following interactions: Age x Stage, Age x Histology, Age x Initial Treatment, Age x Subsequent Treatment, Race x Stage, Stage x Initial Treatment, and Age x Stage x Initial Treatment. This regression was also significant with F (53, 102) = 1.68, p = .0130 and R^2 = .47. Of the interactions studied, the partial regression coefficient of only one was significant. It was Age x Subsequent Treatment F (3, 102) = 3.48, p = .0185.

These findings were used to develop two additional regression models with few independent variables. Once again, at this point in the analysis, the dependent variable was transformed by taking its natural log.

The first of these three models used a single independent variable, stage. The regression was significant F (5, 136) = 5.92, p = .0001. The squared multiple correlation coefficient equaled .18.

The second model used sex and stage as independent variables. These findings are summarized in Table 18.

Table 18

Regression Analysis of Rectocolon Cancer Cases: Model Two

Source	df	F	p
Model	6	5.71	.0001
Sex	1	4.03	.0467
Stage	5	5.27	.0002
			R^2 = .2025

The regression was also significant at the .05 level. The partial regression coefficients of both independent variables were also significant at the .05 level.

Model two, with sex and stage as independent variables, was selected for use in predicting the survival of rectocolon

cancer cases in the sample of patients interviewed. The following equation was used for prediction:

$$\hat{y} = 2.31 + [(-0.36)\ \text{female}] + [(0.73)\ \text{in situ} + (1.22)\ \text{local} + (0.42)\ \text{regional/direct} + (0.88)\ \text{regional/nodes} + (0.37)\ \text{direct/nodes}]$$

The levels of sex and stage were coded in the analysis as ones and zeros. As in the previous cases, the values of b for the levels of these independent variables are contained in brackets in the statement of the equation.

Psychosocial Analysis

The focus of this study was on the relationship between psychosocial variables and survival that is longer or shorter than expected. A description of the psychosocial characteristics of the patients in the sample is given in this section. It is followed by the findings of the analysis to determine the expected survival of each patient in the sample and to calculate a survival quotient for each. This section concludes with the report of the correlation analysis carried out to test the hypotheses.

Psychosocial Variables and Survival

The relationship between psychosocial variables and survival was investigated by correlating psychosocial variables with the survival quotient for the individuals in the sample. A number of psychosocial characteristics were

evaluated and included as independent variables. The characteristics used as independent variables consisted of the 13 vulnerability scales of the Index of Vulnerability, total vulnerability, three clusters of vulnerability scales, three structural indices of social support, and socioeconomic status. The matrix of intercorrelations of psychosocial variables is included as Table 52, Appendix G. Also, the disease variable co-morbidity was included in this part of the analysis and related findings are reported in this section. The dependent variable was the survival quotient, a value which reflected longer or shorter than expected survival.

Descriptive study

Descriptive statistics for the 13 scales of the Index of Vulnerability are presented in Table 19. The ratings on these scales for the 30 individuals in the sample reflected greatest variation among the individuals in terms of turmoil, frustration, and depression, and least differences in terms of hopelessness and denial. The scales with the highest mean values were powerlessness, anxiety, and exhaustion. Those with the lowest mean values were worthlessness and repudiation of key others. Values of total vulnerability, which was the sum of the 13 items, ranged from 16.5 to 38.5 with a mean of 27.07 and a standard deviation of 5.96.

Table 19

Descriptive Statistics of the Scales of the Index of Vulnerability

Scale	Statistic		
	M	SD	Range
Hopelessness	2.3	.50	1.5
Turmoil	1.8	.67	3
Frustration	2.22	.77	3
Depression	2.3	.99	3
Powerlessness	2.6	.69	2.5
Anxiety	2.5	.74	2.5
Exhaustion	2.5	.65	2.5
Worthlessness	1.6	.63	2.5
Abandonment	1.8	.73	2.5
Denial	2.1	.59	1.5
Truculence	1.78	.76	2.5
Repudiation	1.43	.54	2
Time perspective	2.22	.58	2.5

In addition to the evaluation of these scales individually, nine of the 12 scales of the index were grouped into three separate clusters based on what is suggested about their relationships by other studies. Cluster One was constructed from the values for hopelessness, depression, and powerlessness. Values on this variable for the 30 individuals in the sample ranged from 4 to 11 with a mean of 7.27 and a standard deviation of 1.86.

Table 20 illustrates the intercorrelations of the scales of Cluster One.

Table 20

Matrix of Intercorrelations for Cluster One

Item	Hopelessness	Depression	Powerlessness
Hopelessness	1.00	.57*	.61*
Depression	-	1.00	.58

Note. N = 30.
* $p < .05$.

As shown in the table, there were strong positive correlations between the three scales; all were significant at the .05 level. The intercorrelations between these vulnerability scales, and between those of Cluster Two and Three, were taken as measures of the internal consistency of the variables.

Cluster Two consisted of a combination of the scales for turmoil, frustration, and anxiety. Values of this cluster ranged from 3.5 to 12 with a mean of 6.47 and a standard deviation of 1.9. The intercorrelations of these scales are given in Table 21.

Table 21

Matrix of Intercorrelations for Cluster Two

Item	Turmoil	Frustration	Anxiety
Turmoil	1.00	.57*	.68*
Frustration	-	1.00	.63*

Note: N = 30.
* $p < .05$.

Again, there were strong, positive correlations between the scales. All were significant at the .05 level.

Cluster Three included the scales for abandonment, repudiation, and truculence. Values ranged from 3 to 9 with a mean of 5.03 and a standard deviation of 1.55. Intercorrelations are given in Table 22. These scales were also significantly correlated at the .05 level, however, the relationships were not as strong as in Clusters One and Two.

Table 22

Matrix of Intercorrelations for Cluster Three

Item	Abandonment	Repudiation	Truculence
Abandonment	1.00	.45*	.50*
Repudiation	-	1.00	.43

Note: N = 30.
* $p < .05$.

Three of the independent variables tested in the correlation analysis were indices of social support. These included marital status, living arrangements, and the number of family members living in the area.

Of the individuals in the sample, 20 were married, 6 were divorced, 1 was single, and 3 were widowed. The majority of the individuals, 24, lived with their spouse or

with children. Two lived with friends, and four lived alone. Information on the number of family members in a 50 mile radius of the hospital was also collected. The vast majority of individuals, 23, had between one and three family members living in the area. Most had only their spouse. Three individuals had between four and six family members in the area, and one individual had more than seven. Only three had no family in the area at all.

The socioeconomic status of the sample was also evaluated for use as an independent variable. All classes of socioeconomic status were represented by individuals in the group. Two were determined to be in Class I, 7 in Class II, 6 in Class III, 10 in Class IV, and 5 in Class V.

The disease variable co-morbidity was also one of the variables evaluated in this part of the analysis. Values for patients in the sample ranged from the lowest to the highest possible; that is, from 0 to 18. The mean value was 2.83 and the standard deviation was 5.62. An unexpected difficulty in the collection of this information from the patients' physicians resulted in available data on only 12 of the 30 patients at the time of the analysis of data.[1]

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[1] The completion of this scale necessitated a review of the patients' records by the primary physicians. The schedules of two of the participating physicians did not permit this.

Expected survival and the survival quotient

The dependent variable in the analysis was the survival quotient which was derived through a comparison of observed and expected survival. The estimation of survival for each of the 30 individuals who were interviewed was made using the selected regression equation for each of the three cancer sites. Table 23 summarizes the demographic and regression data.

Table 23

Summary of Demographic and Regression Data for the Three Cancer Sites

	Site		
Datum	Lung	Breast	Rectocolon
N	214	96	142
Median Survival	5	25	12
Range	43	77	72
No. of predictor variables	4	2	2
R	.58	.67	.45
$\bar{R}^2$	.34	.45	.20
$\overline{SE}_{est}$	.82	.73	1.04
Years of diagnosis	1979,80	1976,77,78	1977,78,79

The estimation of survival for the 12 lung cancer patients in the sample was based on a regression model with four predictor variables. Estimation for the 12 breast cancer cases and the 6 rectocolon cases was based on models with two predictor variables each.

The estimate (expressed as the natural log transformation) was then compared to the log value of each individual's observed survival and divided by the standard error of estimate for the site being evaluated. This yielded a survival quotient for each patient. The elements of this procedure are reported in Tables 24, 25, and 26.

Table 24

Elements of the Survival Quotient Lung Cancer Cases

Subject	Raw score observed survival	Log value observed survival	Log value expected survival	Log value survival quotient
1	6	1.79	0.95	1.02
2	38	3.64	1.72	2.34
3	7	1.95	1.47	0.59
4	8	2.08	1.41	0.82
5	10	2.30	1.22[a]	1.32
6	3	1.10	-	-
7	12	2.48	1.45	1.26
8	4	1.39	1.80	-0.50
9	2	0.69	0.48	0.26
10	3	1.10	1.10	0
11	8	2.08	1.93	0.18
12	6	1.79	1.08	0.87
				SE_{est} = 0.82

[a] A survival quotient for this case was not calculated because information on stage could not be obtained.

Table 25

Elements of the Survival Quotient: Breast Cancer Cases

Subject	Raw score observed survival	Log value observed survival	Log value expected survival	Log value survival quotient
1	170	5.14	4.16	1.34
2	30	3.40	3.79	-0.49
3	132	4.88	3.23	2.26
4	71	4.26	3.68	0.79
5	25	3.22	3.02	0.27
6	119	4.78	4.16	0.85
7	73	4.29	3.68	0.84
8	48	3.87	4.16	-0.40
9	10	2.30	4.16	-2.55
10	61	4.11	3.72	0.53
11	89	4.49	4.16	0.45
12	23	3.14	3.13	0.01
			$\underline{SE}_{est}$	= 0.73

As noted in the tables, the survival quotients for one case with primary lung cancer and one case with primary rectocolon cancer were not calculated because information on the stage of disease, one of the predictor variables, could not be obtained.

Table 26

Elements of the Survival Quotient: Rectocolon Cancer Cases

Subject	Raw score observed survival	Log value observed survival	Log value expected survival	Log value survival quotient
1	49	3.89	1.95	1.87
2	9	2.20	2.31	-0.11
3	31	3.43	2.68	0.72
4	15	2.71	2.31	0.38
5	16	2.77	- [a]	-
6	32	3.47	3.17	0.29
			$\underline{SE}_{est}$ =	1.04

[a] A survival quotient for this case was not calculated because information on stage could not be obtained.

The survival quotients for the 11 lung cancer cases ranged from -.50 to 2.34. Nine of the 11 survival quotients were positive, an indication that survival was longer than expected for these cases. One of the values was negative, reflecting a shorter than expected survival, and one was equal to zero.

The survival quotients for the 12 breast cancer patients ranged from -2.55 to 2.26. Nine were positive values. The three negative values reflected a shorter survival than expected.

The survival quotients for the five rectocolon patients, ranging -0.11 to 1.87, included four positive values, reflecting survivals longer than expected, and one negative value.

In summary, of the 28 cases for which a survival quotient was calculated, 22 lived longer than expected, 5 lived shorter than expected, and 1 with a survival quotient equal to zero, lived as long as was expected.

Hypothesis testing

The results of the analysis used to test the first three hypotheses is presented in this section. One of these hypotheses concerned with the relationship between psychosocial variables and the survival quotients. The second and third hypotheses had to do with the explanation of the variance in survival by (a) a set of psychosocial variables, and (b) a set of psychosocial variables and co-morbidity.

Hypothesis one: There is no relationship between psychosocial variables and survival.

The correlation analysis revealed positive correlations with five of the vulnerability scales, one of the clusters, and with co-morbidity. None of the relationships were significant at the .05 level: The values of r ranged from .06 to .16.

Although the correlations were quite weak, the analysis suggested that longer survival than expected was associated

with a greater degree of rejection of the support of others (repudiation of key others) and with a greater sense of feeling victimized and not well cared for (truculence). Higher values for frustration were also positively correlated with the survival quotient. One of the clusters of vulunerability scales was associated with longer survival. Cluster Three, which consisted of the scales for abandonment, repudiation, and truculence, was positively correlated with the survival quotient but was not significant at the .05 level. There was no increase in the strength of the relationship as a result of the grouping of the scales.

The correlation analysis also revealed negative correlations with eight of the vulnerability scales, total vulnerability, and two of the clusters. None of the relationships were significant at the .05 level. The negative values of r ranged from -.02 to -.18.

Again, although the correlations were not strong, the findings suggest that shorter survival was associated with higher values of hopelessness, that is, having no hope for recovery or confidence in improvement. The relationship was similar for depression. There were also weak negative associations between anxiety, physical exhaustion, a greater sense of worthlessness and survival.

The three indices of structural support were all negatively correlated with the survival quotient. The results of these correlation analyses are reported in Table 27.

Table 27

Values of the Pearson r for Indices of Structural Support Associated: Shorter Survival

Variable	Pearson r
Marital status	- .25
Number of family members living in the area	- .07
Living arrangements	- .03

Note: N = 28.

Being married was correlated with living shorter than was expected. The relationships between survival and the other indices of support, were negative, but much weaker.

The correlation between socioeconomic status and the survival quotient was also negative r (26) = -.04, p .05 but approached zero. In summary, the null hypothesis was not rejected.

Hypothesis two: There is no relationship between a set of psychosocial variables and survival.

The intended approach to the testing of this hypothesis was a regression analysis using the survival quotient as the dependent variable and psychosocial variables significantly correlated with it as independent variables. Because none of the correlations were significant at the .05 level, the

analysis was not carried out, and consequently, the null hypothesis was not rejected.

Hypothesis three: There is no relationship between a set of psychosocial variables, co-morbidity, and survival.

The intended approach to the testing of hypothesis three was similar to that for hypothesis two in that it involved a regression analysis with the survival quotient as the dependent variable. However, in addition, the disease variable co-morbidity was to be included as an independent variable in the equation. This analysis was not carried out for the same reason noted above. Again, the null hypothesis was not rejected.

Disease Variables and Psychosocial Status

Three additional research questions were formulated during the course of the study to explore how the patient's psychosocial status might reflect certain disease variables. These disease variables appeared to reflect "how ill" the patient was at the time of the interview. Three disease variables were conceptualized as predictor variables in this part of the analysis. They included (a) co-morbidity, (b) the duration of the individual's illness relative to the interview, and (c) the individual's closeness to death at the time of the interview. What follows is a description of the second and third variables and a report of the results of the

correlation analysis used to address the three hypotheses related to these questions.

Descriptive study

One of the independent variables used here included the duration of the illness relative to the interview. This referred to the number of months that had elapsed between the date of the cancer diagnosis and the date of the initial interview for this study. This duration of time for the patients in the sample was important in that it reflected the span of time between the diagnosis of cancer and having a prognosis of six months or less (as judged by their primary physician). Hence, it was a measure of how long, to varying degrees, the individuals had been ill with cancer.

The variability in this duration of time, primarily between individuals with different types of cancer, was not unexpected and reflected the well-recognized differences in morbidity and mortality for cancers of the lung, breast, and rectocolon. The duration of time since the diagnosis was most representative of the duration of illness for the lung cancer patients who experienced a more rapid rate of morbidity and mortality after the diagnosis. It was least representative of the duration of illness for the breast cancer patients who had, in some cases, not been ill from the

cancer for some extended period of time between the diagnosis and first treatment and the recurrence of the disease. Table 28 summarizes descriptive statistics for this variable.

Table 28

Duration of the Illness Relative to the Interview

	Cancer site		
	Lung [a]	Breast [b]	Rectocolon [c]
Duration of illness			
M	6.75	64.42	26.83
SD	8.5	49.17	22.68
Range	31	155	56

[a] $n = 12$. [b] $n = 12$. [c] $n = 6$.

A great deal of variability existed in the duration of the patients' illness prior to the initial interview. Individuals with lung cancer had been diagnosed an average of 6.75 months prior to the interview. In contrast, the diagnosis of breast cancer had been made for the 12 women in the group almost five and one-half years before the interview.

The individuals' closeness to death, another of the independent variables in this part of the analysis, referred

to the time between the interview and the patient's death. This span of time also varied considerably. That is, in spite of the clinical estimation of each person's prognosis, the initial interviews actually took place at various distances in time from their deaths. Table 29 summarizes information related to this variable.

Table 29

Closeness to Death at the Time of the Interview

	Cancer site		
	Lung [a]	Breast [b]	Rectocolon [c]
Closeness to death			
M	2.17	6.5	3.33
SD	1.99	7	3.88
Range	5	22	10

[a] $n = 12$. [b] $n = 12$. [c] $n = 6$.

Hypothesis testing

Three hypotheses were tested to explore the relationships between (a) co-morbidity, (b) duration of the illness, and (c) closeness to death, and certain psychosocial variables. All three hypotheses were addressed through correlation analysis.

Hypothesis four: There is no relationship between co-morbidity and psychosocial variables.

The correlation analysis carried out to test this hypothesis revealed that 10 of the 13 vulnerability scales were negatively correlated with co-morbidity. The correlation between co-morbidity and turmoil was significant at the .05 level [$\underline{r}$ (10) = -.61, $\underline{p} < .05$]. Table 30 lists the values of the Pearson correlation coefficients for these scales.

In general, there was some indication that individuals who did not have other physical conditions that hastened death appeared to experience higher levels of psychological distress during the terminal phase of cancer than those who had other physical conditions. In addition to the relationship noted between co-morbidity and turmoil, there were negative but non-significant relationships with powerlessness, worthlessness, and denial. The small sample size was noted in this case. However, on the basis of the finding concerning co-morbidity and turmoil, the null hypothesis was rejected.

Hypothesis five: There is no relationship between the duration of the illness from cancer and psychosocial variables.

A greater degree of denial was associated ($\underline{p} < .05$) with a shorter duration of illness. Individuals who had been

diagnosed more recently showed more denial of the facts or implications of their illness. Higher values of repudiation, or the degree to which help and support were rejected, were also associated with a shorter period of time between the individual's diagnosis and the initial interview but the relationships were not significant at the .05 level. On the basis of these findings, this null hypothesis was rejected.

Table 30

Correlations Between Co-morbidity and Selected Psychosocial Variables

Variable	Pearson r^a
Turmoil	- .61*
Powerlessness	- .55
Worthlessness	- .52
Denial	- .47
Anxiety	- .36
Repudiation	- .35
Frustration	- .19
Hopelessness	- .18
Exhaustion	- .18
Time perspective	.05
Truculence	- .04
Abandonment	- .02
Depression	.01
Total vulnerability	- .34

[a] $n = 12$.
* $p < .05$.

The correlation analysis revealed two strong negative correlations, one of which was significant at the .05 level. The correlation coefficients are listed in Table 31.

Table 31

Correlations Between the Duration of the Illness and Selected Psychosocial Variables

Characteristics	Duration of illness [a]
Denial	- .39*
Repudiation	- .35
Hopelessness	.17
Depression	.16
Frustration	.16
Abandonment	.09
Time perspective	.05
Truculence	- .04
Anxiety	- .04
Powerlessness	.02
Turmoil	.02
Worthlessness	.00
Exhaustion	.00
Total vulnerability	.06

[a] $N = 30$.
* $p < .05$

Hypothesis six: There is no relationship between the closeness to death and psychosocial variables.

The correlation analysis carried out to test this hypothesis is summarized in Table 32. Although none of these correlations were significant at the .05 level, the correlations between closeness to death and denial was quite strong

with r (28) = -.34, p = .0645. The same was true for the relationship with powerlessness r (28) = -.32, p = .0866 .

Table 32

Correlations Between the Closeness to Death and Selected Psychosocial Variables

	Closeness to death [a]
Denial	- .34
Powerlessness	- .32
Exhaustion	- .29
Worthlessness	- .27
Abandonment	- .27
Hopelessness	- .26
Depression	- .22
Anxiety	- .22
Turmoil	- .21
Time perspective	- .13
Repudiation	- .09
Frustration	- .09
Truculence	- .01
Total vulnerability	- .30

[a] N = 30.

The pattern of relationships that emerged from this analysis may also be noted. When the individuals' closeness to death at the time of the interview was correlated with the vulnerability scales, all correlations were negative. Higher levels of psychological distress appeared to be related to being "more ill" in the sense of being closer to death.

CHAPTER V
DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Issues related to the determination of survival expectations and to the psychosocial analysis are developed in three major sections of this chapter: Discussion, Conclusions, and Recommendations. The first section includes a discussion of the use of regression analysis to determine survival expectations and relative survival. A comparison of data from an earlier study is given along with a comparison of the findings from the present study for cancer of the lung, breast, and rectocolon. This section also includes discussion of the findings regarding psychosocial variables and survival as well as discussion of the importance of disease variables to psychosocial status.

Discussion

Determining Survival Expectations

The survival expectations were determined through regression analyses of information from a sample of deceased lung, breast, and rectocolon cancer patients. These analyses resulted in a prediction equation for each of the three cancer sites. All three equations were statistically

significant at the .05 level. The dependent variable was the number of months the patient survived after the diagnosis. The predictor variables selected for lung cancer were age, stage, initial treatment, and subsequent treatment. For breast cancer, they were stage and subsequent treatment. And, for rectocolon cancer they were sex and stage.

The results show the efficacy of these variables as predictors of survival. This is demonstrated by a comparison of these results to the findings of an earlier study (Worden, Harrison, & Johnston, 1974). A summary of regression data from the 1974 investigation and from the present study is given in Table 33.

The regression data from the earlier study (Worden, Harrison, & Johnston, 1974) are a part of the analysis of data from six cancer sites that was carried out in the development of this procedure. For two of the three sites, the regression equations developed for the present study represent improvements in the explanation of variability in survival by the effects of biological, disease, and medical variables. Also, in the prediction for all three sites the number of variables included in the regression equations is considerably reduced. A further demonstration of the efficiency of these equations for all three cancer sites is that there is a reduction in the standard error of estimate.

Table 33

Summary of Regression Data from Two Studies

	Regression Data	
Cancer site	1985	1974
Lung cancer		
N	214	573
No. of predictor variables	4	25
R^2	.34	.28
SE_{est}	.82	.94
Years of diagnosis	1979, 80	1965
Breast cancer		
N	96	484
No. of predictor variables	2	23
R^2	.45	.23
SE_{est}	.73	1.03
Years of diagnosis	1976, 78	1965
Rectocolon cancer		
N	142	305[a]
No. of predictor variables	2	24
R^2	.20	.22
SE_{est}	1.04	1.38
Years of diagnosis	1977, 79	1965

[a] Included only cancers of the colon.

The lung cancer equation in the present study included 4 predictor variables as compared to 25 main and interaction effects included in the earlier study. Although the analysis for the present study included an initial evaluation of seven main effects and seven interaction effects, many of these contributed very little to the prediction of survival and were excluded from the final equation with an increase in the

value of $\underline{R}^2$ over the earlier study. The standard error of estimate for the lung cancer equation in the present study was slightly less than that from the earlier investigation.

The regression equation for breast cancer in the present study included 2 predictor variables as opposed to 23. These 2 were selected from a total of 13 independent variables initially evaluated. The equation resulted in a value of $\underline{R}^2$ that was considerably larger than the value from the earlier study, as well as in a smaller standard error of estimate.

The validity of the comparison of these two sets of results is less for the rectocolon group because the earlier study included no cases of rectocolon cancer. However, again, the present study used an equation with 2 as compared to 24 variables that had a slightly lower value of $\underline{R}^2$ and a lower standard error of estimate.

The improved efficiency of the regression equations is the result of the selection of a small number of relatively powerful variables. In the present study, the identification of these began with the methods used to code information for important treatment variables and included the elimination of variables with little predictive power from the regression equations.

In the 1974 investigation, each single treatment modality and all interactions between treatment modalities and other variables were used as independent variables. For

lung cancer, these variables accounted for 20 of the 25 variables used in the equation. In the present study, two treatment variables were conceptualized. These were initial treatment and subsequent treatment. The combination and sequence of treatment modalities was recorded for both of these treatment variables through coding of the various categories in ones and zeros. This method not only reduces the number of variables for evaluation but results in an increase in the amount of important information included in the treatment variables. Two kinds of information are gained by this method. The first is related to the difference between initial and subsequent treatment. Because the initial treatment is the "definitive" attempt to cure the cancer, this is an important characteristic of the patient's treatment plan. The second kind of information gained by this method is related to the sequence in which various kinds of treatment are given.

The identification of variables in the present study also involved exploratory regression analyses for all three cancer sites. These analyses revealed differences between the cancer sites in terms of the variables that had predictive power and the degree to which certain variables contributed to the explanation of variability in survival. The stage of disease was the best predictor of survival for all three sites. These findings are in keeping with the

present understanding of important prognostic indicators for cancer survival (National Institutes of Health, 1977). Age was an important predictor of survival only for the lung cancer cases and sex was an important predictor of survival only for the rectocolon cancer cases. Of the treatment variables, both initial and subsequent treatment predicted survival for lung cancer while only subsequent treatment predicted the survival for breast cancer.

A comparison of the regression data fom the present study for the three cancer sites reveals that prediction by the fewest independent variables, the largest value of $\underline{R}^2$ and the smallest standard error of estimate was achieved for the cases of breast cancer. However, the regression model for breast cancer is subject to considerable sampling error. This is because the analysis had to be made on patients diagnosed in recent years who were deceased at the time of data collection. As a result, the patients from the selected years of diagnosis who were still living at the time of data collection were excluded from the sample. Because of the great variability in the survival of breast cancer patients, this regression model is actually based on a sample of the group with the poorest survival. Hence, the predictions from the model are likely to be underestimates of the survival for patients with this type of cancer.

These three regression equations were subsequently used to predict the survival of the individuals who were interviewed. Then, the values for their expected survival were compared to their actual survival and the differences divided by the standard error of estimate for the particular site. The resulting value, called the survival quotient, was used in the correlation analysis with psychosocial variables.

Of the 28 survival quotients calculated, 79% (n = 22) reflected longer than expected survival. The log values of these survival quotients ranged from 0.01 to 2.34. Fifteen of the 22 were less than 1.0 and 5 were between 1.0 and 2.0. That such a large majority of these patients survived longer than expected may be related to the survival expectations being underestimates of the entire cancer site population. In addition, this may be related to the fact that all predictions were made for patients who were receiving some kind of medical care, and for this reason, their survival was longer than would be expected for all patients, including those unknown patients who received no medical care.

Psychosocial Analysis

Psychosocial variables and survival

The psychosocial findings were based on a correlation analysis of psychosocial variables with the survival quotient. None of the associations between the psychosocial variables and survival were statistically significant at the

.05 level. However, there appeared to be a trend in the associations between these variables and survival.

Longer survival than expected was associated ($p > .05$) with a greater degree of rejection of the support of others (repudiation), a greater sense of feeling victimized and not well-cared for (truculence), and a greater sense of frustration. The values of r ranged from .10 to .16. Shorter survival than expected was associated ($p > .05$) with hopelessness, depression, anxiety, physical exhaustion, and worthlessness. The values of r ranged from -.12 to -.18 with the strongest relationship between hopelessness and shorter survival. Shorter than expected survival was also associated with being married [r (26) = -.25, $p > .05$].

The finding in the present study that being married was associated with living shorter than expected conflicts with the results of other studies. The explanation for this difference is believed to be related to the validity of this variable in the present study.

Marital status was used as one of several measures of social support. It was assumed that being married would reflect a greater degree of available social support than would being widowed or divorced. However, in the present study, this proved to be an invalid assumption in several cases. For example, one of the married patients who lived shorter than expected was a 71 year old woman with breast

cancer who experienced a profound, silent depression and apparent sense of despair during the last five months of her life. She seemed to feel abandoned in these last months by her husband who gave her very superficial attention and devoted his energy to flirtation with the nursing staff. On the other hand, one of the divorced patients who lived longer than expected was a 55 year old woman with breast cancer who lived with her son, daughter-in-law, and two grandchildren. She expressed a great appreciation for the concern provided by her family and felt that her ability to cope with the illness and treatment depended on their support and assistance.

Although these findings do not provide evidence for a relationship between psychosocial variables and survival, the trend in the associations is in keeping with the findings of a number of other studies. The results of related investigations are summarized in Table 34.

These findings have been interpreted as suggesting that longer survival, or a favorable disease outcome otherwise, is associated with a type of response and attitude at or around the time of diagnosis. This response has been characterized as one of strong hostile drive without loss of emotional control and as one involving an attitude of denial or a fighting spirit as opposed to stoic acceptance or a helpless/hopeless response. In one investigation, individuals who survived

Table 34

Psychosocial Variables and Survival Expectations: Summary of Findings

Study	Longer survival/ favorable outcome	Shorter survival/ unfavorable outcome
Stavraky et al., 1968 N = 199	Strong hostile drives without loss loss of emotional control around diagnosis*	
Greer, Morris, & Pettingale, 1979 N = 69	Initial response to diagnosis one of denial or fighting spirit*	Unmarried, poor social relationships
Rogentine et al., 1979 N = 64	Expected more life adjustment in order to cope with disease*	Lack of concern; denial or repression of the disease*
Davies et al., 1973 N = 42		Attitude of "apathetic-given-up"*
Weisman & Worden, 1975 N = 35	Terminal co-operation, rising resentment, terminal apathy*	Poor social relationships, early separation, death wish, low denial*
Achterberg & Lawlis, 1977 N = 126		Greater denial in terminal phase, helplessness*
Drogatis, Abeloff, & Melisaratos, 1979 N = 35	More emotional distress, more Negative attitudes toward physicians*	
Funch & Marshall, 1983 N = 352	Social involvement, subjective index of stress*	
Berg et al., 1977 N = 60 - 3600 per cancer site		Low socioeconomic status for all cancer sites[a]

[a] Inferential analysis was not carried out on this data.
* $p < .05$.

longer reportedly expected that more life adjustment would be required to cope with the disease than did those whose survival was shorter. The findings from studies of individuals with terminal illness suggest that longer survival is associated with maintaining good social relationships, being receptive to support, accepting the reality of the illness, and with a higher social class. In addition, other findings indicate that longer survivors are those with more emotional distress, poorer adjustment, and more negative attitudes towards physicians.

On the other hand, individuals with shorter survival or an unfavorable outcome otherwise, include patients who responded to the diagnosis with a lack of concern or reduced emotional reactivity in general. Patients with shorter survival have also been described as having an attitude of helplessness, apathy, hopelessness, and depression during the terminal phase of the illness. Shorter survival is also associated with poor social relationships and low socioeconomic status.

In spite of the apparent trend in these associations, such findings should be interpreted with caution. This is supported by the findings of a very recent report of a large (N = 359) prospective investigation conducted by Cassileth, Lusk, Miller, Brown, & Miller (1985). Their work does not support the idea of a relationship between psychosocial

variables and survival. In this investigation, factors selected for study were those identified in other studies as predictors of the survival of cancer patients. The factors were selected from the findings of recent investigations including several noted in Table 34 (Derogatis, Abeloff, & Melisarotos, 1979; Greer, Morris, & Pettingale, 1979; Rogentine et al., 1979; Weisman & Worden, 1975). The variability in survival due to medical and disease variables was carefully controlled by limiting the sample to patients with certain types and stages of cancer. The authors report that, no statistically significant ($p > .05$) survival differences were found between patients in categories of high, middle, and low psychosocial scores.

Disease variables and psychosocial status

The need for caution in the interpretation of findings of an association between psychosocial variables and survival is largely due to the complex nature of the relationship between psychosocial and physical factors. For example, although hopelessness and depression are correlated with shorter survival and may alter physical processes that in turn hasten death, these characteristics may be a manifestation of the degree of physical illness. In the present study, these relationships were explored further through correlation analysis of disease variables including

(a) co-morbidity, (b) the duration of time since the diagnosis, and (c) the closeness to death. These variables were correlated with the scales of the Index of Vulnerability.

The first of these correlation analyses suggests that higher levels of psychological distress, or vulnerability, appear to be experienced by individuals who do not have the other physical conditions that hasten their death. Ten of the 13 vulunerability scales were negatively correlated with co-morbidity. In particular, higher levels of turmoil were significantly associated with lower levels of co-morbidity [$\underline{r}$ (10) = -.61, $\underline{p} < .05$]. A greater sense of powerlessness, worthlessness, denial, anxiety, and repudiation were also. Although only one of the scales was significantly correlated with co-morbidity at the .05 level, many of the correlations were much stronger than the associations between the same variables and survival.

Considering a somewhat general interpretation of the meaning of co-morbidity, it appears that individuals who are in better health before the cancer diagnosis and who experience fewer unrelated physical problems during the illness are more distressed and experience a greater sense of loss of control and esteem as compared to patients in

poorer health before the cancer diagnosis. The higher levels of turmoil among those with low co-morbidity may reflect the attempt to cope and adapt to a new type of difficulty and recent disability. On the other hand, the lower levels of turmoil among patients with higher values of co-morbidity may reflect a state of adaptation to chronic illness, to the need for medical treatment, or to chronic disability.

The findings of the second correlation analysis of disease variables dealt with the relationship between the duration of time between the diagnosis and interview and psychosocial variables. The findings suggest that higher values of denial [r (28) = -.39, $p < .05$] are associated with a shorter duration of illness. Although the relationships were not statistically significant at the .05 level, the findings suggest that higher values of hopelessness and depression are associated with a longer duration of illness.

In a literal sense, having a shorter duration of illness means that the cancer diagnosis was made earlier relative to the initial interview. Individuals with a more recent diagnosis acknowledged the implications of their illness less than those who had been diagnosed longer.

The interpretation of this finding should not be limited to speculation about the patients' use of denial as a defense mechanism but should include recognition of

differences in what patients may or may not be told about their illness and prognosis. That is, the understanding that terminal cancer patients express of their illness and prognosis may be limited by what they can cope with as well as by what kind of information they are actually given.

Having a longer duration of illness means that the diagnosis was made earlier relative to the initial interview. The more important meaning of this variable is in terms of what experience the patient might have had during the longer period of time.

In general, a longer duration of illness from cancer can represent at least two very different courses of the disease and illness. On one hand, the illness may be characterized by diagnosis and initial treatment, a period of being free of the signs and symptoms of disease, the development of metastatic disease, the initiation of additional (subsequent) treatment, and death from the metastatic disease. On the other hand, patients with a longer duration of illness may have been diagnosed and received treatment, such as chemotherapy, on a more or less continuous basis from the time of diagnosis to the time of death. In either case, what appears to be important about this variable is that it signifies the potential for the patient with a longer duration of illness to have had more treatment for their illness.

Although the expectations for survival were based on considerable information about the treatment given, this aspect of treatment, that is, how much was given, was not evaluated. The amount of treatment received by patients is important both in terms of how this reflects the aggressiveness of their disease and what extent of disability there may be from treatment side-effects.

The findings of this particular correlation analysis are especially interesting in light of the relationships between the same psychosocial variables and longer or shorter than expected survival. Table 35 summarizes the findings for the variables with the strongest associations with the duration of illness.

Table 35

Psychosocial Variables and the Duration of Illness: Comparison of Correlation Coefficients

Variable	Duration of illness [a]	Longer survival [b]	Shorter survival [c]
Denial	-.39*	--	-.07
Repudiation	-.35	.15	--
Time perspective	.20	--	.06
Hopelessness	.17	--	-.18
Depression	.16	--	-.16
Frustration	.16	.10	--

[a] $n = 30$. [b] $n = 28$. [c] $n = 28$.

* $p < .05$.

A comparison of these relationships shows that higher values of hopelessness and depression were associated with a longer duration of illness and with shorter than expected survival. Similarily, frustration was associated with a more recent diagnosis and with longer survival than was expected. It is interesting to note that the relationship between these two sets of associations is suggested by the findings of Derogatis et al. (1979) that patients with an earlier death also had a longer duration of prior chemotherapy. The implication appears to be that the patients who were in some way more ill, had an earlier death.

The most striking pattern of relationships emerges when the association between closeness to death and vulnerability is considered. The closeness to death is, in a very simple sense, a measure of how ill the person was at the time of the interview. Although the correlations varied in strength, and although none were significant at the .05 level, all were negative. Those who were closer to death showed greater degrees of denial (p = .0645), a greater sense of powerlessness, and higher levels of exhaustion. The strongest associations between these variables and closeness to death are presented in Table 36 along with the correlations of the same variables and survival.

Table 36

Psychosocial Variables and Closeness to Death: Comparison of Correlation Coefficients

Variable	Closeness to death [a]	Longer survival [b]	Shorter survival [c]
Denial	-.34	--	-.07
Powerlessness	-.32	--	-.06
Exhaustion	-.29	--	-.12
Worthlessness	-.27	--	-.12
Abandonment	-.27	.09	--
Hopelessness	-.26	--	-.18
Depression	-.22	--	-.16
Anxiety	-.22	--	-.12
Turmoil	-.21	--	-.04
Time perspective	-.13	.06	--

[a] $n = 30$. [b] $n = 28$. [c] $n = 28$.

Interestingly enough, many of the same variables that were associated with shorter survival were also associated with being closer to death.

These findings underscore the importance of an appropriate interpretation of correlational studies regarding psychosocial variables and survival. The findings suggest that the psychosocial characteristics that were studied do not reflect personality traits that in some way contribute

to shorter or longer survival than was expected. Instead, these characteristics seem to be related to the degree of physical illness. This notion has been suggested by Sherman (1983) who asserted that much that is labeled depression in the cancer population may really reflect the physical condition. Another perspective of this relationship is provided by Davies et al. (1973), who reported that high scores on the constellation "apathetic-given-up" correlated strongly ($p < .05$) with both survival time and with a greater illness disability as measured by the Karnofsky Performance Scale. These authors also collected information on the subjects' position in time relative to diagnosis and death, but the relationships between these values and the psychiatric factors studied was apparently not included in the correlation analysis.

Conclusions

Determining Survival Expectations

Several conclusions are drawn regarding the determination of survival expectations for cancer patients. They are related to the use of regression analysis to predict survival from biological, medical, and disease variables, the importance of the measurement of variables with predictive power, and the use of the survival quotient as a value of relative survival. The conclusions are as follows:

1. The variability in the survival of cancer patients is largely related to the primary site of the cancer. Differences in the survival of patients with the same cancer site can be partly accounted for by other disease variables and by biological and medical variables. The proportion of variability that can be explained by these variables can be demonstrated through regression analysis.

2. The procedure used in the present study suggests that an important issue in the explanation of variability is the discrimination of differences on particularly important independent variables such as the stage of the disease and the medical treatment given. The findings of this study suggest that an even greater proportion of the variability in survival could be explained by disease and treatment variables were the measurement of these refined.

3. Although prediction equations were developed for three cancer sites studied and could be for any cancer site, the equations for cancers that are characterized by a wide range of morbidity and mortality are subject to sampling error unless the analysis is delayed until all or most individuals diagnosed at a specific time have died. This was the case in the present study for the analysis of breast cancer cases, and to some degree for the rectocolon cancer analysis.

4. This type of analysis used along with the calculation of survival quotient (Worden, Harrison, & Johnston, 1974) provides a means of determining whether patients have survived longer or shorter than expected, and in turn, provides a value that reflects their relative survival. This permits the further study of the importance of psychosocial variables in survival with statistical control of medical and disease variables.

Psychosocial Analysis

The conclusions drawn from the psychosocial analysis are presented in two sections. The first section gives the conclusions regarding the findings of the analysis. The conclusions related to the methods of the psychosocial analysis are included in the second section.

Findings of the analysis

The findings of the analysis suggest conclusions regarding the relationship between psychosocial variables and survival, the interpretation of findings concerning this relationship, and the relationship between disease variables and psychosocial status. The conclusions are as follows:

1. The findings of this study do not provide evidence of a relationship between psychosocial variables and the survival of elderly teminal cancer patients. Although a trend in the relationships between psychosocial variables and survival is suggested by the results, these variables do

not account for the variability in survival that remains after certain disease and medical variables are taken into consideration through regression analysis.

2. There is some evidence from related literature that emotional expression and the attitude about the illness and recovery are correlated with survival. However, this evidence is not conclusive.

3. The findings of this study provide evidence of a relationship between certain disease variables and the psychosocial status of elderly terminal cancer patients.

4. Specifically, evidence of a relationship between co-morbidity and psychosocial status is given. The level of emotional turmoil experienced is related to co-morbidity ($p < .05$) such that higher levels of turmoil were experienced by patients who had been in better health before the cancer diagnosis and who experienced fewer, unrelated physical problems during the illness.

5. Evidence is also given that psychosocial status is related to the duration of the illness. The findings indicate that greater denial is associated with a more recent diagnosis ($p < .05$). And, although the relationships were not as strong, hopelessness and depression were associated with a longer duration of illness.

6. The pattern of correlations between the closeness to death and psychosocial variables suggests that the

psychosocial status of elderly terminal cancer patients is related to the degree of their illness. In the present study, higher values on all indices of psychological vulnerability were associated with being closer to death. Although none were statistically significant at the .05 level, the strongest associations were between the closeness to death and denial, powerlessness, and exhaustion.

Methods of the psychosocial analysis

The conclusions regarding the methods of psychosocial evaluation are as follows:

1. The findings of the psychosocial analysis were based on information collected through an interview and recorded on a rating scale for psychosocial vulnerability. Considering the degree of physical disability and debilitation that is often experienced by elderly terminal cancer patients, the interview procedure is a practical and productive approach to this kind of study. It allows for a measure of flexibility that is required in the collection of information from individuals who are very ill. The patients who participated in this study were responsive to the questions asked and the content of the interview was relevant to their concerns.

2. In spite of the relative simplicity of the rating method used for the psychosocial variables, this method is a useful means of measuring various types and degrees of

emotional distress that are particularly relevant to cancer patients. The measurement of psychosocial status was not improved by the development of clusters from the scales of the index.

3. The methods used to study the importance of social support proved to be inadequate. Because these indices represent complex social phenomena in a very general way, a meaningful interpretation of the findings could not be made.

4. The psychosocial evaluation made in this study can only be said to reflect transient, or state features of the personality. However, valid conclusions about the more abiding features of the personality could not have been drawn from an evaluation conducted during the terminal phase of the illness because of the psychological and physical effects of the disease and treatment.

5. The prospective design is the most appropriate approach to the investigation of these relationships. However, the present study illustrates the amount of time required to develop even a small sample for study. In this case, referrals to the study were evaluated for 13 consecutive months before a sample of 30 was established. And, although the findings from correlation analysis must be interpreted cautiously, this type of analysis is appropriate considering the complex nature of the variables and the present understanding of the relationships.

Recommendations

Determining Survival Expectations

The recommendations of the study regarding the determination of survival expectations are given as they relate to the conclusions stated in the previous section. The recommendations are:

1. The effects of biological, medical, and disease variables must be taken into consideration in studies which explore the relationship between psychosocial variables and survival. The method used in the present study provides a means of control for the effects of these variables that depends on access to the records of many cancer patients but does not require a sample of patients for analysis that represents one cancer site. When larger numbers of patients are available for study, control of these variables would be more economically achieved by limiting the population for study to patients with a single cancer site, similar stage, and similar treatment history.

2. The explanation of variability in the survival of cancer patients is related to the discrimination of differences on important variables such as treatment. In addition to the qualitative information on treatment that was studied in the present investigation, quantitative information on treatment should be considered in the selection of the sample or the analysis of data. The number

of months on active treatment since the date of diagnosis would provide such a general measure.

3. The most appropriate use of the procedure used in this study for determining survival expectations is with cancers with a rapid morbidity and mortality such as lung cancer.

4. The survival quotient (Worden, Harrison, & Johnston, 1974), provides a valid measure of survival that is longer or shorter than expected. However, because a small number of medical and disease variables are powerful predictors of survival, there does not appear to be an advantage in controlling the effects of these variables through this procedure rather than through the delineation of the patient population.

Psychosocial Analysis

The recommendations of the study concerning the psychosocial analysis are given as they relate to the findings of the study and to the methods of psychosocial analysis.

Findings of the analysis

The following recommendations are made concerning the findings of the psychosocial analysis:

1. The relationship between psychosocial variables and the survival of cancer patients should be studied with careful consideration of medical and disease variables that affect survival. However, in addition, investigations

should offer a means of evaluating the effect of the illness and treatment on psychosocial variables that appear to be related to longer or shorter survival.

2. The evidence from related literature that emotional expression and the attitude about the illness are correlated with survival should not be interpreted as suggesting a causal relationship.

3. The relationship between variables that reflect the degree of illness and psychosocial status should be studied further.

4. Specifically, the importance of co-morbidity in the experience of elderly terminal cancer patients should be thoroughly explored with a large sample and with measurement of the variable in a way that suggests the meaning of the relationship more clearly. An evaluation of the health history of the patients in terms of pre-existing and concurrent disease and disability is recommended.

5. The relationship between the duration of the illness from cancer and psychosocial status should also be investigated. In particular, the evaluation of the treatment experience of the patients should be refined to include quantitative information as noted above.

6. It is also recommended that information on the psychosocial status of cancer patients be compared to the patients' closeness to death as a simple means of

identifying variability in psychosocial status that may be accounted for by the degree of illness.

Methods of psychosocial analysis

The recommendations regarding the methods of analysis are:

1. Interview schedules developed for use with terminal cancer patients should not be lengthy and should be designed for reliable administration over a series of sessions with patients who tire easily.

2. It is recommended that rating scales used to evaluate the psychosocial status of terminal cancer patients be calibrated to discriminate between important differences in certain moods and attitudes. Psychosocial evaluation should also include a more thorough evaluation of hopelessness and depression, one that permits study of the relationship between physical factors and these psychosocial characteristics.

3. Adequate study of the relationship between social support and the survival of cancer patients clearly requires more thorough evaluation of social involvement and interpersonal relationships. However, because there is little evidence of such a relationship and more evidence that medical and disease variables account for the variability in survival of cancer patients, further study of this relationship does not have a high priority in terms of theoretical or practical significance.

4. A part of what remains to be addressed in this area of study is the delineation between the trait and state features of the personality. The delineation must be made both as these features are conceptualized in the statement of research questions and as they are measured by clinical evaluation. Attempts to study the association between trait features of the personality and survival should not be based on an evaluation of the patient with advanced disease because of the psychological and physical effects of the disease and treatment on what can be observed and evaluated about the personality. Strictly speaking, a valid evaluation of such personality variables should precede the cancer diagnosis.

5. Although the prospective design is the most appropriate approach to the investigation of the relationship between psychosocial variables and the survival of terminal cancer patients, the design is not well-suited to an investigation that must be conducted within a limited time unless a very large patient population is available for study. It is recommended that studies operating under such constraint focus on the relationship between the degree of illness and psychosocial status rather than on the matter of survival.

APPENDIX A
THE PSYCHOSOCIAL INTERVIEW

1. To begin with, tell me a little about yourself; that is, your family, your work, and so forth.

(Questions two through four were asked if the responses to them were not given.)

2. With whom do you live at this time? Are there family members living in the area, say, within 50 miles of here? What relationship are they to you?

3. What kind of work did you do for a living? How about your spouse?

4. What education or training have you had? How about your spouse?

5. How did you happen to come to the hospital?

6. What are the symptoms that you have?

7. What has your doctor told you about your illness? What do you think about that?

8. What is the treatment that you are having here? In what way do you expect that treatment will help?

9. What about all of this has been most difficult for you lately?

10. How has it been lately for you and your family? Friends?

11. What has seemed to help you get along during this time?

12. How has your care been here at the hospital?

13. What would you see yourself doing, say, six months from now? What, if anything, might interfere with that?

APPENDIX B

INDEX OF VULNERABILITY

SCORE_____ NAME _____

DATE _____ RATER _____

OMEGA VULNERABILITY RATING SCALES

	4	3	2	1
HOPELESSNESS	No hope for recovery	Doubtful regarding recovery	Cautious	Confident regarding recovery
TURMOIL	Highly agitated	Very restless	Fidgety	Calm & composed
FRUSTRATION	Very frustrated angry over plight	Moderate frustration and anger	Irritable; mild frustration	Feels problems are being adequately handled
DEPRESSION	Very depressed and dejected	Sad; moderately depressed	Mild depression	Not at all depressed
POWERLESSNESS	Feels overpowered; unable to initiate	Not sure if help can help	Needy but able to ask for help	Resourceful and self-sufficient
ANXIETY	Panicky; feels overwhelmed	Frightened, with specific fears	Uneasy; qualms	Feels safe and in little danger
EXHAUSTION	Exhausted; too tired to care	Fatigued and somewhat apathetic	Tired but still cares; seems engaged	Zestful and engaged

	4	3	2	1
WORTHLESSNESS	Worthless; not okay and never will be; undeserving	I'm not okay; feels flawed and inadequate	I'm okay but I goof up, make mistakes	I'm okay; strong self regard
ABANDONMENT	Feels abandoned and rejected	Lonely and isolated	Feels somewhat neglected	Feels cared for and well looked after
DENIAL	Avoids speaking word "cancer" or its equivalent	Admits diagnosis and illness, but denies implications	Uncertain or euphemism	Correct perception of illness and related problems
TRUCULENCE	Feels victimized, bitter, mistreated by caregivers	Has doubts and serious questions regarding care and treatment	Believes that only "adequate" care is being given	Feels that very good care is received. Very + attitude to caregivers
REPUDIATION	Rejects or antagonizes sources of support	Mild rejection of others; somewhat sullen	Accepts help grudgingly	Gladly accepts sources of help and support
TIME PERSPECTIVE	Closed; no tomorrow	Only a day at a time	Cautious about future; wait and see	Unlimited; foresees future as if no illness

APPENDIX C
INDEX OF CO-MORBIDITY

Patient's Name: _____ Physician: _____

I. Please indicate the extent to which conditions of these systems may have contributed to or hastened the patient's death.

	Very Much	A Little	Not At All
Central Nervous			
Cardiovascular			
Pulmonary			
Hemotopoietic			
Kidneys			
Gastrointestinal			
Endocrine			
Musculo-skeletal			
Genital			

II. Please indicate the extent to which conditions of these systems may have negatively influenced the effectiveness of treatment for the cancer.

	Very Much	A Little	Not At All
Central Nervous			
Cardiovascular			
Pulmonary			
Hemotopoietic			
Kidneys			
Gastrointestinal			
Endocrine			
Musculo-skeletal			
Genital			

APPENDIX D
CODE BOOK

DEMOGRAPHIC/IDENTIFYING DATA

Name: _____ Initial Contact: _____
Case ID: _____
Registry ID: _____

Age: _____

Sex:
_____ 1 Female
_____ 2 Male

Race:
_____ 1 White
_____ 2 Black
_____ 3 Hispanic
_____ 4 Other

Marital Status:
_____ 1 Widowed
_____ 2 Single
_____ 3 Separated/Divorced
_____ 4 Married

Living Arrangements:
_____ 1 Alone
_____ 2 With spouse or children or with members of family
_____ 3 With friends

Number of family and relatives living within 50 miles radius of present home.
_____ 1 None
_____ 2 1-3
_____ 3 4-6
_____ 4 7+

Education (Head of Household) _____

Occupation (Head of Household) _____

SES Class

_____ 1 Class I
_____ 2 Class II
_____ 3 Class III
_____ 4 Class IV
_____ 5 Class V

VULNERABILITY

Date:	_____	_____	_____	_____	_____	_____	_____	_____
Hopelessness:	_____	_____	_____	_____	_____	_____	_____	_____
Turmoil:	_____	_____	_____	_____	_____	_____	_____	_____
Frustration:	_____	_____	_____	_____	_____	_____	_____	_____
Depression:	_____	_____	_____	_____	_____	_____	_____	_____
Powerlessness:	_____	_____	_____	_____	_____	_____	_____	_____
Anxiety:	_____	_____	_____	_____	_____	_____	_____	_____
Exhaustion:	_____	_____	_____	_____	_____	_____	_____	_____
Worthlessness:	_____	_____	_____	_____	_____	_____	_____	_____
Abandonment:	_____	_____	_____	_____	_____	_____	_____	_____
Denial:	_____	_____	_____	_____	_____	_____	_____	_____
Truculence:	_____	_____	_____	_____	_____	_____	_____	_____
Repud. of SKO:	_____	_____	_____	_____	_____	_____	_____	_____
Time Persp.	_____	_____	_____	_____	_____	_____	_____	_____
Overall Score:	_____	_____	_____	_____	_____	_____	_____	_____

CO-MORBIDITY

Extent to which conditions contributed to death.

_____ Central Nervous
_____ Cardiovascular
_____ Pulmonary
_____ Hemotopoietic
_____ Kidneys
_____ Gastrointestinal
_____ Endocrine
_____ Musculo-skeletal
_____ Genital
_____ Total

Extent to which conditions negatively influenced treatment.

_____ Central Nervous
_____ Cardiovascular
_____ Pulmonary
_____ Hemotopoietic
_____ Kidneys
_____ Gastrointestinal
_____ Endocrine
_____ Musculo-skeletal
_____ Genital
_____ Total

Site of primary cancer:

_____ 1 Lung
_____ 2 Breast
_____ 3 Colon

Date of diagnosis: ____/____/____

Date of death: ____/____/____

No. of months survived: _____

Staging:

_____ 0 In situ
_____ 1 Local
_____ 2 Reg./Dir. Ext.
_____ 3 Reg./Nodes
_____ 4 Dir. Ext./Nodes
_____ 5 Regional, Nos.
_____ 6 Non-Local
_____ 7 Distant
_____ 8 Lymphoma/IV
_____ 9 Unknown

HISTOLOGY:

_____ 1 Epidermoid carcinoma (squamous cell)
_____ 2 Large cell anaplastic carcinoma
_____ 3 Adenocarcinoma (incl. bronchiolar car.)
_____ 4 Small cell carcinoma (oat cell)
_____ 5 Inflammatory
_____ 6 No histological diagnosis (clinical)
_____ 7 Undetermined

INITIAL TREATMENT:

_____ 1 Surgery
_____ 2 Radiation Therapy
_____ 3 Chemotherapy
_____ 4 Other (Single)

INITIAL TREATMENT (continued)

_____ 5 Surgery/Radiation
_____ 6 Surgery/Chemotherapy
_____ 7 Surgery/Chemotherapy/Radiation
_____ 8 Surgery/Radiation/Chemotherapy
_____ 9 Radiation/Surgery
_____ 10 Radiation/Chemotherapy
_____ 11 Radiation/Surgery/Chemotherapy
_____ 12 Radiation/Chemotherapy/Surgery
_____ 13 Chemotherapy/Radiation
_____ 14 Chemotherapy/Surgery
_____ 15 Chemotherapy/Surgery/Radiation
_____ 16 Chemotherapy/RadiationSurgery
_____ 17 Other Combination
_____ 18 Unknown
_____ 19 Hormonal
_____ 20 Hormonal/Chemotherapy
_____ 21 Surgical/Hormonal/Chemotherapy
_____ 22 Surgical/Hormonal
_____ 23 Hormonal/Radiation
_____ 24 Hormonal/Radiation/Chemotherapy
_____ 25 Chemotherapy/Hormonal
_____ 26 Radiation/Hormonal
_____ 27 Radiation/Chemotherapy/Hormonal
_____ 28 Surgical/Radiation/Hormonal
_____ 29 Radiation/Surgical/Hormonal
_____ 30 Surgical/Chemotherapy/Hormonal
_____ 31 Surgical/Hormonal/Radiation

SUBSEQUENT TREATMENT

_____ 1 Surgery
_____ 2 Radiation Therapy
_____ 3 Chemotherapy
_____ 4 Other (single)
_____ 5 Surgery/Radiation
_____ 6 Surgery/Chemotherapy
_____ 7 Surgery/Chemotherapy/Radiation
_____ 8 Surgery/Radiation/Chemotherapy
_____ 9 Radiation/Surgery
_____ 10 RadiationChemotherapy
_____ 11 Radiation/Surgery/Chemotherapy
_____ 12 Radiation/Chemotherapy/Surgery
_____ 13 Chemotherapy/Radiation
_____ 14 Chemotherapy/Surgery
_____ 15 Chemotherapy/Surgery/Radiation
_____ 16 Chemotherapy/Radiation/Surgery
_____ 17 Other Combinations

_____ 18 Unknown
_____ 19 Hormonal
_____ 20 Hormonal/Chemotherapy
_____ 21 Surgical/Hormonal/Chemotherapy
_____ 22 Surgical/Hormonal
_____ 23 Hormonal/Radiation
_____ 24 Hormonal/Radiation/Chemotherapy
_____ 25 Chemotherapy/Hormonal
_____ 26 Radiation/Hormonal
_____ 27 Radiation/Chemotherapy/Hormonal
_____ 28 Surgical/Radiation/Hormonal
_____ 29 Radiation/Surgical/Hormonal
_____ 30 Surgical/Chemotherapy/Hormonal
_____ 31 Surgical/Hormonal/Radiation

APPENDIX E
PATIENT CONSENT FORM

Name of Graduate Researcher: LAURA CASON

I hereby acknowledge that on _____, I was informed by LAURA CASON (graduate researcher) of the UNIVERSITY OF FLORIDA, of a project having to do with the relationship between emotions, attitudes, and beliefs, and the health of persons with cancer.

I understand that the procedures in this project include interviews. In addition, I am aware that my physician's report of my general health status will be included in the information used in this study. I further understand that all procedures will be carried out at Halifax Hospital Medical Center with the permission of my physician.

I am aware that this datum will be kept confidential to the extent provided by law and that no monetary award for participation is available. I also understand that I may withdraw my participation in this project at any time.

I have read and I understand the procedure described above. I agree to participate in the project and I have received a copy of this description.

Signatures: _____ _____
(patient) (date)

_____ _____
(witness) (date)

_____ _____
(graduate researcher) (date)

APPENDIX F

DETERMINING SURVIVAL EXPECTATIONS: COMPARISON OF GROUPS USED IN REGRESSION ANALYSIS

Table 37

Comparison of Lung Cancer Cases: Age and Survival

Characteristic	Sample			
	N = 266 [a]	n = 221 [b]	n = 214 [c]	n = 12 [d]
Age				
M	66.33	65.72	65.50	66.42
SD	10.01	9.91	9.94	6.93
Survival				
M	7.56	7.98	8.73	8.92
SD	8.12	8.24	8.15	9.64

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis.

Table 38

Demographic Characteristics of Lung Cancer Cases

Characteristic	Sample			
	N = 266 [a]	n = 221 [b]	n = 214 [c]	n = 12 [d]
Race				
White	246	204	199	12
Black	20	17	15	0
Sex				
Female	76	62	64	4
Male	190	159	150	8

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis.

Table 39

Disease Characteristics of Lung Cancer Cases

Characteristic	Sample			
	N = 266 [a]	n = 221 [b]	n = 214 [c]	n = 12 [d]
Histology				
Epidermoid	74	71	66	3
Large cell	33	30	26	0
Adenocarcinoma	68	65	58	4
Small cell	58	57	47	5
Spindle cell	2	2	2	0
Undetermined	31	0	15	0
Stage				
In situ	1	1	1	0
Local	26	25	23	0
Regional, direct extension	31	28	26	4
Regional, nodes	22	21	20	1
Direct extension nodes	6	6	6	0
Regional, NOS[e]	1	1	1	0
Non-local	1	1	1	0
Distant	154	138	136	6
Unstaged	24	0	0	1

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis. [e] NOS: not otherwise specified.

Table 40

Initial Treatment of Lung Cancer Cases

Characteristic	Sample			
	N = 266 [a]	n = 221 [b]	n = 214 [c]	n = 12 [d]
None	41	19	19	2
Surgery	18	17	14	1
Radiation	87	73	75	3
Chemotherapy	42	37	31	3
Surgery, radiation	15	14	15	0
Surgery, chemotherapy	3	3	3	0
Surgery, chemotherapy, radiation	5	5	5	0
Surgery, radiation, chemotherapy	6	6	6	0
Radiation, chemotherapy	21	21	21	1
Chemotherapy, radiation	25	24	22	2
Chemotherapy, hormonal	1	1	1	0
Radiation, hormonal	1	0	1	0
Radiation, chemotherapy, hormonal	1	1	1	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis.

Table 41

Subsequent Treatment of Lung Cancer Cases

Characteristic	Sample			
	N = 266 [a]	n = 221 [b]	n = 214 [c]	n = 12 [d]
None	237	193	186	9
Radiation	15	15	15	2
Chemotherapy	11	10	10	0
Radiation, Chemotherapy	3	3	3	0
Chemotherapy, radiation	0	0	0	1

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis.

Table 42

Comparison of Breast Cancer Cases: Age and Survival

Characteristic	Sample			
	N = 101 [a]	n = 96 [b]	n = 96 [a]	n = 12 [d]
Age				
M	65.44	64.80	65.07	62.08
SD	14.37	14.35	14.51	8.17
Survival				
M	27.17	26.80	26.92	73
SD	18.93	18.53	18.40	51

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Breast cancer patients interviewed for psychosocial analysis.

Table 43

Demographic Characteristics of Breast Cancer Cases

Characteristic	Sample			
	N = 101 [a]	n = 96 [b]	n = 96 [a]	n = 12 [d]
Race				
White	91	86	91	12
Black	10	10	10	0
Sex				
Female	101	96	96	12
Male	0	0	0	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Breast cancer patients interviewed for psychosocial analysis.

Table 44

Disease Characteristics of Breast Cancer Cases

Characteristic	Sample			
	N = 101 [a]	n = 96 [b]	n = 96 [a]	n = 12 [d]
Histology				
Undifferentiated	1	1	1	1
Adenocarcinoma	96	92	93	11
Inflammatory	3	3	3	0
Unknown	1	0	1	0
Stage				
In situ	0	0	0	0
Local	4	4	4	5
Regional, direct extension	20	19	20	1
Regional, nodes	31	31	31	4
Direct extension nodes	3	3	3	0
Regional, NOS[e]	0	0	0	0
Non-local	0	0	0	0
Distant	39	39	38	2
Unstaged	4	0	0	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis. [e] NOS: not otherwise specified.

Table 45

Initial Treatment of Breast Cancer Cases

Treatment	Sample			
	N = 101 [a]	n = 96 [b]	n = 96 [a]	n = 12 [d]
None	6	5	5	0
Surgery	33	29	29	9
Radiation	5	5	5	0
Chemotherapy	1	1	1	0
Surgery, radiation	22	22	22	0
Surgery, chemotherapy	6	6	6	3
Surgery, chemotherapy, radiation [e]	8	8	8	0
Radiation, surgery, chemotherapy	2	2	2	0
Hormonal	1	1	1	0
Surgery, hormonal, chemotherapy	1	1	1	0
Surgery, hormonal	4	4	4	0
Hormonal, radiation	4	4	4	0
Chemotherapy, hormonal	1	1	1	0
Radiation, chemotherapy, hormonal	1	1	1	0
Surgery, radiation, hormonal	5	5	5	0
Radiation, surgery, hormonal	1	1	1	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Lung cancer patients interviewed for psychosocial analysis. [e] NOS: not otherwise specified. [f] Includes cases that received surgery followed by chemotherapy and radiation in either order. [g] Includes cases that received surgery followed by radiation and hormonal therapy in either order.

Table 46

Subsequent Treatment of Breast Cancer Cases

Treatment	Sample			
	$N = 101$ [a]	$n = 96$ [b]	$n = 96$ [a]	$n = 12$ [d]
Name	53	49	49	0
Radiation	10	10	10	2
Chemotherapy	7	7	7	2
Surgery, radiation	1	1	1	0
Surgery, chemotherapy	1	1	1	0
Radiation, chemotherapy[e]	3	3	3	7
Radiation, surgery, chemotherapy	1	1	1	0
Hormonal	10	10	10	0
Hormonal, chemotherapy	3	2	2	0
Surgery, hormonal	1	1	1	0
Hormonal, radiation, chemotherapy	1	1	1	0
Chemotherapy, hormonal	7	7	7	0
Radiation, hormonal	1	1	1	1
Radiation, chemotherapy, hormonal	2	2	2	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Breast cancer patients interviewed for psychosocial analysis. [e] Includes cases that received radiation and chemotherapy in either order.

Table 47
Comparison of Rectocolon Cancer Cases: Age and Survival

Characteristic	Sample			
	N = 166[a]	n = 156[b]	n = 142[c]	n = 6[d]
Age				
M	71.70	71.01	70.37	67.50
SD	10.80	10.47	10.62	8.69
Survival				
M	17.96	18.42	20.81	25.33
SD	17.89	18.08	17.79	14.81

[a] Original sample. [b] Cases with missing values for stage histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Rectocolon cancer patients interviewed for psychosocial analysis.

Table 48

Demographic Characteristic of Rectocolon Cancer Cases

Characteristic	Sample			
	N = 166[a]	n = 156[b]	n = 142[c]	n = 6[d]
Race				
White	157	147	134	5
Black	9	9	8	1
Sex				
Female	96	90	84	2
Male	70	66	58	4

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Rectocolon cancer patients interviewed for psychosocial analysis.

Table 49

Disease Characteristics of Rectocolon Cancer Cases

Characteristic	Sample			
	N = 166[a]	n = 156[b]	n = 142[c]	n = 6[d]
Histology				
Epidermoid	5	5	5	0
Adenocarcinoma	152	151	151	6
Unknown	9	0	4	0
Stage				
In situ	1	1	1	0
Local	27	26	25	1
Regional, direct extension	17	17	16	1
Regional, nodes	25	25	23	1
Regional, NOS[e]	0	0	0	0
Non-local	0	0	0	0
Distant	66	64	56	3
Unstaged	6	0	0	1

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Rectocolon cancer patients interviewed for psychosocial analysis. [e] NOS: not otherwise specified.

Table 50

Initial Treatment of Rectocolon Cancer Cases

	Sample			
Treatment	N = 166[a]	n = 156[b]	n = 142[c]	n = 6[d]
None	15	10	9	0
Surgery	93	90	77	4
Radiation	3	2	3	0
Chemotherapy	1	1	1	0
Surgery, radiation	5	5	5	1
Surgery, chemotherapy	27	27	25	1
Radiation, surgery	22	21	22	0

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Rectocolon cancer patients interviewed for psychosocial analysis.

Table 51

Subsequent Treatment of Rectocolon Cancer Cases

	Sample			
Treatment	$N = 166^a$	$n = 156^b$	$n = 142^c$	$n = 6^d$
None	130	122	106	2
Surgery	1	1	1	0
Radiation	9	8	8	1
Chemotherapy	20	19	19	2
Radiation, chemotherapy	5	5	5	0
Chemotherapy	1	1	1	1

[a] Original sample. [b] Cases with missing values for stage and histology excluded. [c] Cases with missing values for stage and log survival excluded. [d] Rectocolon cancer patients interviewed for psychosocial analysis.

APPENDIX G

MATRIX OF INTERCORRELATIONS
INDEPENDENT AND DEPENDENT VARIABLES

Table 52

Matrix of Intercorrelations: Independent and Dependent Variables

	Hope	Turm	Frust	Depr	Powrl	Anx	Exht
Hope	-	.25	.25	.57*	.61*	.49*	.63*
Turm	.25	-	.57*	.31	.64*	.69*	.10
Frust	.25	.59*	-	.53*	.56*	.63*	.17
Depr	.57*	.31	.53*	-	.58*	.78*	.66*
Powrl	.61*	.64*	.56*	.58*	-	.78*	.57*
Anx	.49*	.69*	.63*	.78*	.78*	-	.51*
Exht	.63*	.10	.17	.66*	.57*	.51*	-
Worth	.29	.35*	.28	.35	.49*	.33	.23
Aband	.52*	.43*	.48*	.83*	.67*	.77*	.61*
Denl	-.12	.26	.06	.17	.16	.28	.29
Truc	.20	.53*	.54*	.33	.51*	.51*	.24
Repu	.31	.21	.47*	.34	.37*	.29	.37*
Time	.58*	.14	.44*	.50*	.53*	.50*	.39*
Vuln	.62*	.64*	.71*	.82*	.86*	.89*	.65*
Cone	.80*	.46*	.56*	.90*	.84*	.83*	.73*
Ctwo	.39*	.85*	.85*	.63*	.78*	.90*	.32
Cthre	.41*	.50*	.60*	.60*	.61*	.65*	.48
Mstat	-.10	.04	.25	.16	-.09	.19	.05
Fam	.00	-.08	.24	.17	-.19	-.02	.09
Livar	-.03	.20	.18	.18	.21	.24	.15
Ses	.34	-.15	-.07	.19	.17	.11	.21
Comor	-.18	-.61*	-.19	.01	-.55	-.36	-.18
Dxit	.17	.02	.16	.16	.02	-.04	.00
Itdod	-.26	-.21	-.09	-.22	-.32	-.22	-.29
Lsq	-.18	-.04	.10	-.16	-.06	-.12	-.11

Table 52 - continued

	Worth	Aband	Denl	Truc	Repu	Time	Vuln
Hope	.29	.52*	-.12	.20	.31	.58*	.62*
Turm	.35*	.43*	.26*	.53*	.21	.14	.64*
Frust	.28	.48*	.06	.54*	.47*	.44*	.71*
Depr	.35	.83*	.17	.33	.34	.50*	.82*
Powrl	.49*	.70*	.16	.51*	.37*	.53*	.86*
Anx	.33	.77*	.28	.51*	.29	.50*	.89*
Exht	.23	.61*	.29	.24	.37*	.39*	.65*
Worth	-	.36*	.27	.13	.28	.18	.51*
Aband	.36*	-	.15	.50*	.45*	.45*	.85*
Denl	.30	.15	-	.22	.02	-.13	.30
Truc	.13	.50*	.22	-	.43*	.26	.64*
Repu	.28	.45*	.02	.43*	-	.12	.52*
Time	.18	.46*	-.13	.26	.12	-	.57*
Vuln	.51*	.85*	.30	.64*	.52*	.57*	-
Cone	.44*	.82*	.12	.41*	.40*	.62*	.92*
Ctwo	.39*	.66*	.22	.61*	.39*	.44*	.87*
Cthre	.28	.82*	.16	.82*	.72*	.33	.82*
Mstat	-.10	-.02	.00	-.16	-.02	-.10	.02
Fam	-.12	.05	-.23	-.17	.00	-.02	.18
Livar	.15	.09	.32	-.05	.14	-.14	.19
Ses	.35	.30	.11	.11	.11	.13	.24
Comor	-.52	-.02	-.47	-.04	-.35	.05	-.34
Dxit	-.01	.09	-.39*	.03	.04	.20	.66*
Itdod	-.27	-.27	-.34	-.01	.09	-.13	-.30
Lsq	-.12	.09	-.07	.14	.15	.06	-.04

Table 52 - continued

	Cone	Ctwo	Cthre	Mstat	Fam	Livar	Ses
Hope	.80*	.39	.41*	-.10	.00	-.03	.34
Turm	.46*	.85*	.50*	.04	-.08	.20	-.15
Frust	.56*	.85*	.60*	.25	.24	.18	-.07
Depr	.90*	.63*	.60*	.16	.17	.18	.19
Powrl	.84*	.78*	.61*	-.09	-.19	.21	.17
Anx	.83*	.90*	.65*	.19	-.02	.24	.11
Exht	.73*	.32	.48*	.05	-.19	.15	.21
Worth	.44*	.39*	.28	-.10	-.12	.15	.3[illegible]
Aband	.82*	.66*	.82*	-.02	-.05	.09	.30
Denl	.12	.22	.15	.00	-.23	.32	.11
Truc	.41*	.61*	.82*	-.16	-.17	-.05	.11
Repu	.40*	.39*	.72*	-.02	.17	.14	.11
Time	.62*	.44*	.33	-.10	.00	-.14	.13
Vuln	.92*	.87*	.82*	-.02	-.02	.19	.24
Cone	-	.73*	.65*	.03	.02	.16	.26
Ctwo	.73*	-	.68*	.13	.05	.23	-.02
Cthre	.65*	.68*	-	-.08	.01	.07	.20
Mstat	.03	.18	-.08	-	.47*	.55*	.19
Fam	.18	.05	.01	.47*	-	.20	-.11
Livar	.16	.23	.07	.55*	.20	-	-.20
Ses	.26	-.02	.20	.19	-.11	-.20	-
Comor	-.23	-.43	-.15	-.09	.16	-.51	.24
Dxit	.14	.06	.07	-.11	.08	-.25	-.24
Itdod	-.31	-.20	-.04	-.04	-.06	-.22	-.21
Lsq	-.15	-.02	.14	-.25	-.07	-.03	-.04

Table 52 - continued

	Comor	Dxit	Itdod	Lsq
Hope	-.18	.17	-.26	-.18
Turm	-.61*	.02	-.21	-.04
Frust	-.19	.16	-.09	-.10
Depr	.01	.16	-.22	-.16
Powrl	-.55	.02	-.32	-.06
Anx	-.36	-.04	-.22	-.12
Exht	-.18	.00	-.29	-.11
Worth	-.52	-.01	-.27	-.12
Aband	-.02	.09	-.27	-.09
Denl	-.47	-.39*	-.34	-.07
Truc	-.04	.03	-.01	.14
Repu	-.35	.04	.09	.15
Time	.05	.20	-.13	.06
Vuln	-.34	.66*	-.30	-.04
Cone	-.23	.14	-.31	-.15
Ctwo	-.43	.06	-.20	-.02
Cthre	-.15	.07	-.04	.14
Mstat	-.09	-.11	-.04	-.25
Fam	.16	.08	-.06	-.07
Livar	-.51	-.25	-.32	-.03
Ses	.24	-.24	-.21	-.04
Comor	-	.60*	-.16	.09
Dxit	.60*	-	.18	.41*
Itdod	-.16	.18	-	-.08
Lsq	.09	.41*	-.08	-

Note. The explanation of abbreviations used in the table is as follows: Hope = hopelessness, Turm = turmoil, Frust = frustration, Depr = depression, Powrl = powerlessness, Anx = anxiety, Exht = exhaustion, Worth = worthlessness, Aband = abandonment, Denl = denial, Truc = truculence, Repu = repudiation, Time = time perspective, Vuln = total vulnerability, Cone = Cluster One, Ctwo = Cluster Two, Cthre = Cluster Three, Mstat = marital status, Fam = no. of family members living in the area, Livar = living arrangements, Ses - socioeconomic status, Comor - co-morbidity, Dxit = duration of time from diagnosis to interview, Itdod = duration of time from interview to death, Lsq = log of survival quotient.
Note. All correlations were based on 30 cases with the exception of those with co-morbidity which were based on 12.
* $p < .05$.

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Laura Rose Cason was born in Avon Park, Florida on July 28, 1954. She lived in Sebring, Florida, and attended Highlands County public schools until 1971 when she entered the Advanced Studies Program at Stetson University in DeLand, Florida. In 1975 she graduated Magna Cum Laude with a Bachelor of Music in Piano and with the equivalent of a minor in psychology. Ms. Cason completed a Master of Arts in Guidance and Counseling at Stetson in 1977, and since that time, has worked in teaching and counseling. For six years she has been involved in providing hospice care, and during the last two years served as the Psychosocial Coordinator of the Regional Oncology Center of Halifax Hospital Medical Center in Daytona Beach, Florida. In that capacity she provided counseling to Cancer patients and their families. Ms. Cason is currently the Assistant Manager of the Regional Oncology Center.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosopy.

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